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JOURNAL

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Vol. 25. (Second Series) DECEMBER, 1948 No. 4

THE CULLING OF POULTRY FOR EGG PRODUCTION.

By R. H. Morris, Agricultural Adviser.

THE ability and willingness to cull has been and will always be of prime importance as a necessary requirement of the successful poultry farmer. Today more so than ever, high cost of production together with shortages of building materials, and many of the more important poultry feeding-stuffs demand that the poultry farmer's energies and feeding-stuffs be directed to the production of eggs from profitable hens only. He cannot hope to do this if he is reluctant to rigorously cull his flock. Having the ability to cull is of little use if he is not prepared to cull frequently and to immediately dispose of those individuals that he knows to have become unprofitable. The successful poultry farmer is the man who watches his flock daily, ever on the lookout for birds that have "broken down," become diseased, developed vicious habits, or in the case of growing chicks, those that lag behind the rest of the flock in their development. These are a few of the signs which label the "cull" bird. When he sees these profit-consuming individuals, he is quick to destroy or market them, as he realises the danger they are to the financial wellbeing of his family and himself. Such a man is ruled by his head, not by his heart, with the result that he does not keep his fowls—his fowls keep him.

Single pen testing and trap nesting of hens give an accurate record of a fowl's annual egg production. These methods of testing are, however, not available to the majority of poultry farmers, and as it has been found by research workers and poultrymen the world over that certain body features can be closely correlated with high or low egg production, it is proposed in this article to outline these features and so describe the "good" and the "bad" points which we look for in selecting and discarding hens for egg production. This method is known as the "observation and handling method." Body features are of the greatest importance in separating the very high producers from the very low producers. Also these body features when noted at intervals during the year tell fairly accurately of the fowl's past performance. In this way we are given a guide as to her probable future performance, as a bird

which has performed well in the past is most likely to perform well in the future. Culling should not be applied to laying hens only, but also to hatching eggs, chicks, pullets, cockerels and breeding males.

Unfortunately, no system of culling is infallible, even expert cullers being likely to reject a few good birds and retain a few poor ones when examining a laying flock, but the numbers that are likely to be misjudged are so few that this factor need not be taken into consideration.

As mentioned previously, the culling of poultry involves the recognition and disposal of birds, which show themselves to be unprofitable. These unprofitable birds may be the result of an inferior genetic makeup which does not fit them for high or even medium egg production or the result of mismanagement on the part of the flock attendant. The most common examples of mismanagement are:— Improper feeding (including watering) and housing of the birds, and allowing the birds to become diseased. This latter example may or may not be the result of the farmer's neglect.

Before attempting to cull a flock its history should therefore be known. The history embraces information relating to the quality and type of stock, month of year when chickens were hatched, length of time the birds have been in production, diseases suffered by the birds, the management and feeding of the birds, type of housing, and incidence of broodiness.

The time of the year in which chickens are hatched is particularly important and producers will find that they are amply repaid for any effort they might make to secure their chicks at the optimum time of the year. It has been proved conclusively that it pays to hatch chickens during the months of July, August and September in Western Australia. A late hatched chicken will not develop as well as a chick hatched in season and will often take nine months to come into production. Such a pullet will lay well during September and October when egg prices are at their lowest, and poorly during the high price period. On the other hand, with the very early hatched chicken (May-June) there is a real danger of the pullet going into a neck moult shortly after commencing production with consequent loss of production at a time (February, March, April) when the farmer is in need of all the eggs this bird can possibly produce.

The months recommended for hatching chickens in Western Australia are:— Heavy breed chicks, July-August; light breed chicks, August-mid September. Because of the varying climates found between Geraldton and the extreme south of the State, the following table (See page 313) has been included to guide Western Australian producers as to the time of the year they should take delivery of day-old chicks. Local climatic conditions must be taken into consideration when deciding on the best time to procure chickens; because of this no hard and fast time can be allocated to any one district.

Unless otherwise stated, remarks made about the various classes of stock in this article refer to chickens hatched in season for the metropolitan area, and which would be expected to commence laying in March.

When first gaining experience in culling, the farmer should place hens he thinks to be "culls" in a pen by themselves, and their egg production over one or two weeks should be recorded. In this way the farmer will gain confidence in himself. Having once gained this confidence he is more likely to set about the job of culling with an easy mind and be drastic in his decisions should circumstances warrant it. At certain times of the year one feature in itself (e.g. the

early moulting hen) is sufficient evidence on which to cull a bird. At other times of the year several body features must be taken into consideration before a bird is discarded.

PURCHASING TIMES FOR CHICKENS.

District.	Optimum Week.		Range.
	Heavy Breeds.	Light Breeds.	
Geraldton and Eastern Wheat Belt :—			
Narembeen, Wyalkatchem, Dowerin, Merredin, Corrigin	2nd week July	4th week July	3 weeks.
Northam-Katanning	3rd week July	1st week August	5 weeks.
Metropolitan	1st week August	3rd week August	5 weeks.
Waroona	1st week August	1st week September	5 weeks.
Bunbury	3rd week August	2nd week September	5 weeks.
Southern Coastal Band :—			
Busselton, Mt. Barker, Pemberton, Albany	1st week September	3rd week September	3 weeks.

The question is often asked. "How many years does it pay to keep fowls?" or "Someone told me to dispose of my hens after they have finished their second year's lay. Is this correct?" No, it is not correct. When determining the worth of a flock we must examine each individual bird in that flock and immediately a bird shows signs of becoming unprofitable, it must be discarded. The practice of holding hens until they reach a certain age or until the production of a pen of birds falls to a certain level and then discarding them "en masse," irrespective of the individual merits of each bird in the pen, is not a sound one. In reply to the first question, experience has shown that the most economical flock to keep for egg production is one which carries approximately two laying pullets to every one or one-and-a-half adult hens, an adult hen being regarded as a two, three or four year old hen.

When attempting to increase the average egg laying capacity of an inferior flock the 2 : 1 ratio should be used. Having once obtained a satisfactory lay of approximately 180 eggs per bird per year the use of a 2 : 1½ ratio should be economically sound, when the flock average falls below this figure however, the necessity for more drastic culling of the birds is indicated.

Figures issued by the Government Statistician, covering the number of pullets and old hens (one year and over) which constitute a portion of the poultry population of Western Australia show how unbalanced the poultry industry is in this State. Statistics for 1946 show that in March of that year (a month in which the maximum number of potential layers would be carried on a commercial farm and a month in which all old hens should have been culled) there were more old hens than pullets (hatched 1945) being carried by the industry. That this unfavourable balance is shown not only by State-wide figures but by figures gathered from nearly all of our generally recognised "poultry districts" is a tragedy and obviously one of the most important single factors which is retarding the progress of the industry today.

To illustrate the importance of culling hens of laying age it is interesting to compare returns (value of eggs less rearing and feeding costs) which we could expect to receive from a culled and unculled flock respectively.

Let us first consider the unculled flock. The expenditure on, and return per bird from such a flock could easily be as follows:—

	Per Bird.
Chicks at £8 per 100 allowing 20 per cent. loss	1 11
Brooding	3
Feeding to 24 week old stage	2 6
Total expenses to date	4 8
Eggs laid first 12 months, average 12 dozen per bird (@ 1s. 7d. per dozen)	19 0
Feed cost during the 12 months laying period	10 0
Profit	9 0
Less rearing costs	4 8
Net profit per bird end of first year	4 4
Second year laying 75 per cent. of first year = nine dozen (@ 1s. 7d.)	14 3
Cost of feeding second 12 months	10 0
Net profit	4 3

Under such management the second year birds return the same profit (approximately) as the birds in their first year of lay, and if we were content with this small profit there would be little advantage in carrying twice as many pullets as we have hens. BUT are we content with this small profit? Let us now examine the return we would expect from a well culled flock.

	Per Bird.
Rearing costs	4 8
Eggs laid first 12 months, 15 dozen (@ 1s. 7d. per dozen)	23 9
Feed costs during 12 months laying period	10 0
Profit	13 9
Less rearing costs	4 8
Net profit	9 1

By drastically culling one half of the pullet flock, the remaining birds in the second years lay should equal the average lay of the first year flock:—

Fifteen dozen @ 1s. 7d. per dozen	23 9
Food cost during second 12 months	10 0
Profit	13 9

The average profit per bird from a culled flock such as this which carries two pullets to every adult hen is 11s. 5d., as compared with 4s. 3½d. for the unculled flock. The general health of the culled flock would be far superior to that of the unculled flock and the mortality rate would be much lower.

Should a pullet flock which averages 15 dozen eggs per bird per year be left unculled it is reasonable to assume that the value of the eggs laid by each bird in her second year (75 per cent. production of first year) would be approximately 18s. instead of 23s. 9d. per bird for the culled flock. This means that a profit of 8s. per bird would be obtained from the unculled second year hens instead of the estimated 13s. 9d. for the culled second year hens—a difference of 5s. 9d. per bird per year or £287 10s. 0d. per 1,000 birds per year.

The rate of culling practised on the average farm should be approximately as follows:—

One thousand seven hundred day old chicks bought August-September.

One thousand three hundred and fifty pullets left after deaths (10 per cent.) and heavy culling to commence the first year production in March.

One thousand three hundred pullets left by July after culling out those that have gone into a neck or body moult thereby showing themselves to be unprofitable birds. Also to be culled would be those birds that after having laid for several weeks take a fortnight or three weeks rest. If birds of this latter type are not culled, these rest periods, and there will be many more during the year, will be of longer and longer duration as the year progresses. Of these 1,300 birds, approximately eight per cent. to ten per cent. will die during the first year and if they are heavy breed pullets (Australorps) 50 per cent. will be culled as they "break down" and/or become excessively fat and cease production from November to February inclusive, leaving approximately 550 birds to commence the second years production. It is usually not necessary to cull a White Leghorn flock of pullets as drastically as heavy breed pullets and of 1,300 White Leghorn pullets approximately 650 would be left to commence the second year's lay.

These 550-650 hens in their second year of lay would be culled during the laying season and particularly towards the close of the laying season. As a result of this culling, approximately 160 hens would be left to commence the third year's lay. The few that would warrant keeping over until the fourth year's laying season could well be used as breeding stock.

The most common features taken into consideration in culling hens for egg production are:—pigmentation changes, the capacity or body measurements shown by the birds, the moult, the appearance and texture of the comb, wattles and ear lobes, structure of the skull, and the disposition and temperament of the bird. It is proposed to treat these individual features before discussing the culling of growing chickens and the pullet flock. A short section on the selection of birds for the breeding pen has also been included.

Pigmentation Changes.—Yellow skinned breeds are so called because of the yellow pigment which they carry in their bodies, and which is most clearly seen in the skin around the vent, the eyelid, the earlobe, the beak and the shanks. This yellow pigment (xanthophyll) which is observed in these regions in a non-laying hen or pullet is the same pigment which gives the yellow colouration to egg yolks.

When fowls commence to lay there is a consequent deposition of the yellow pigment in the yolks, as a result of fecundity which deflects the normal path of secretion of the xanthophyll from the skin to the egg yolk.

The return of this pigment to the vent etc., is a measure of persistency, as this pigment begins to return to these regions immediately the bird ceases production and by noting the extent of pigmentation in these regions one can estimate the approximate time the hen or pullet has been in or out of production as the case may be. This is made possible by the fact that the pigment of the external parts disappears in a definite order at varying rates, and is regained by them in exactly the same order at which it is lost, only at a quicker rate.

The first region to lose the pigment when laying commences is the vent. This region will be devoid of pigment within a few days of the commencement of laying and is sometimes lost even before the first egg is dropped.

The pigment is then lost from the eyelid and earlobes in that order. Within one month or by the time 10 eggs (approximately) have been laid, the earlobes will have become bleached. The beak then loses its colour, bleaching begins at the corner of the mouth, or base of the beak, and gradually fades towards the tips. The arch of the mandible (top portion of beak) is the last part to lose the pigment. From five to eight weeks production or the laying of 25-50 eggs will usually see the elimination of all colour from the beak. Within three to five months the shanks will have lost their colour. The front of the shank loses its colour first and the back last, while the colour is retained longest just below the featherline at the rear of the hock joint. The shanks are the last region to regain the pigment when laying ceases.

The amount of pigment present in the birds depends on—

(i) The condition of the bird, (the fatter the bird the greater the amount of pigment present);

(ii) the type of food eaten by the bird.

Some foodstuffs are richer in xanthophyll than others. Yellow maize and green foods are rich in xanthophyll and will produce deeper coloured flesh than foodstuffs like bran, pollard, wheat and milk. Pigmentation observations should always be made in daylight, artificial light being unsatisfactory.

Because of the larger amount of fat present in the heavy breeds, light breeds usually bleach more rapidly than heavy breeds. The order of the most common breeds according to the rapidity with which the pigment fades is as follows:—Leghorns, Wyandottes, Plymouth Rocks and Rhode Island Reds.

It is difficult by the pigmentation test alone to distinguish between really good birds that have been laying continuously at a fast rate and those that have laid continuously at a slow rate. Both will have white shanks and in differentiating between these two classes of birds, use should be made of the capacity test.

A bird with a yellow vent, eyelid, earlobe, beak and legs has not been laying. The appearance of the comb and handling will indicate whether or not she is just beginning. A bird with a white vent but fully pigmented elsewhere has just begun or is about to lay.

A bird with yellow vent, eyelid and lobe, white beak and yellow legs has probably laid well for about two months but not long enough to bleach her shanks and has recently left off laying long enough to allow the pigment to return to the vent, eyelid and lobe but not long enough to return it to the beak.

A bird with white shanks, white tip of the beak but yellow vent, eyelid, lobe and base of the beak has laid well but is resting at the time of handling.

Because of an inhibiting factor which is present in the white skinned birds and dark shanked birds the yellow pigment cannot express itself in the external regions such as the vent, beak, etc. The pigmentation test, therefore, cannot be applied to a breed such as the Australorp.

Capacity.—Capacity is the term given to the distance between the rear end of the keel or breast bone and the two pelvic bones which lie slightly above, and to either side of the vent. For the sake of convenience this measurement is usually based on finger widths, and a fowl is said to have a small or a large capacity according to the number of fingers which when placed side by side can be fitted between the pelvic bones and the end of the breast bone. Capacity tells us whether or not a fowl is laying and also gives us an idea as to the rate of laying, or the number of eggs produced in a week.

Showing different features found in a high producing White Leghorn pullet (173 eggs, laid April-November, 244 days). Note well developed comb, deep body, broad flat back, and (page 318) the excellent capacity as shown by the backbone and breastbone being parallel to each other and four finger widths between the pelvic bones and rear end of the breastbone. Note also the good width (three fingers) between the two pelvic bones which in this bird are fine, flat and pliable.

See also page 317.

1.

2. 3. 4.

A series of photographs (taken December) of an Australorp pullet which in the early part of her pullet year (April November, 244 days) laid 215 eggs.

1. Note the shapely head, good deep body and broad back.

2. Clearly shows the parallel back and keel, which is most desirable in a good-laying hen.

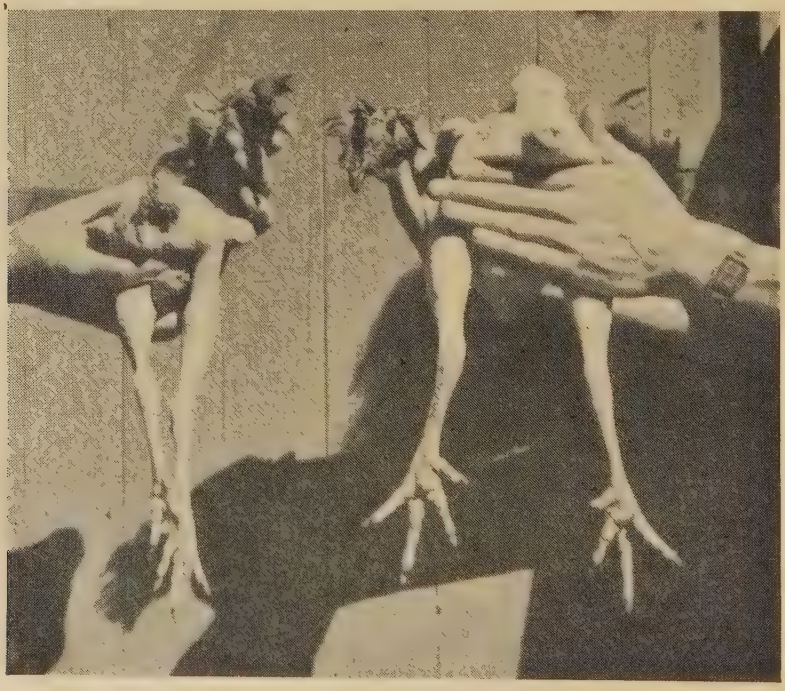
3. This picture illustrates an unusually large capacity of six finger widths, and at the time of handling she was laying 5-6 eggs per week.

4. A three finger pelvic span.

At the time of handling the pelvic bones were fine and pliable, showing her to be in good laying condition.

A fowl in production eats a large amount of food, and the digestive system is necessarily enlarged to cope with the increased food intake. The small intestine in particular is enlarged, as it is in this organ that most of the food is digested, and it is through the walls of the small intestine that most of the food nutrients are taken into the fowl's system. In addition the size of the ovary and oviduct of a high producing hen is many times as large as the same organs in a non-producing hen. The development of the digestive and reproductive systems in the manner described expands the abdominal muscles to their utmost, and the rear end of the breast bone is forced downwards to provide extra room for the enlarged organs. This results in the backbone and breastbone in a bird with excellent capacity being parallel to each other. Generally speaking the higher the rate of production the greater the capacity. The low producers or non-producing hens are "narrow behind" or wedge-shaped, they show little capacity. The methods used to determine capacity is to be seen in the accompanying photographs. (See pages 318, 319 and 341.) These photographs show the bird resting on the operator's left palm and forearm, with the left elbow close to the side of the body. The bird's two legs are firmly gripped by the fingers. Birds should be held in this manner, whenever they are handled, as in this position both the operator and the bird are comfortable.

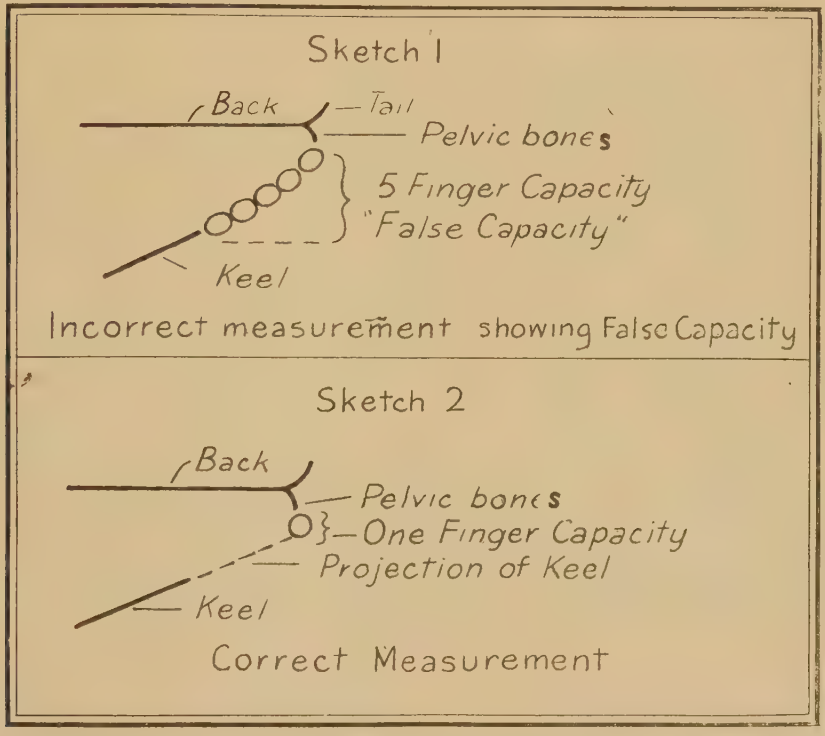
The photographs also show the right hand placed in the correct position to measure capacity. The forefinger is rested alongside the pelvic bones, and the palm of the hand is kept at a right angle to the longitudinal axis of the fowl's body. The true capacity of the bird is the distance between the pelvic bones and the point where the projection of the breastbone strikes the right hand. The low producing hen very often has a short breastbone, and with such birds if the hand is pressed



1A. 2A.

1A. shows the reduced capacity of a non-laying white leghorn hen. But 2A. depicts a good four finger capacity, of an Australorp hen in production.

into the abdomen on an angle so as to be in a direct line with the pelvic bones, and the end of the breastbone, a "false" capacity is indicated (see sketches 1 and 2). It is because of this, that the projection of the breastbone referred to above and not the actual tip of the breastbone is always used in measuring capacity.

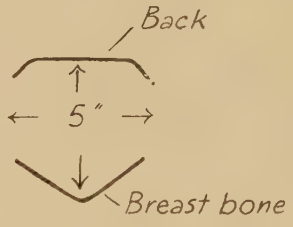


A fowl showing a high rate of production (five to six eggs per week) invariably shows good width between the two pelvic bones, finger measurements are used here also. The pelvic bones in the laying hen are flat sided, thin, pointed and pliable, and are fully extended at the time of maximum production. The pelvic bones in the non-laying hen are more or less rigid, close together and often have a thick covering of fat.

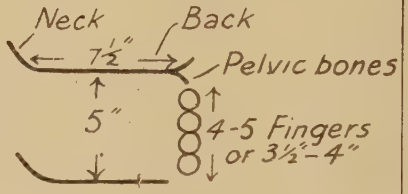
A hen that at the time of handling has a good capacity, i.e., four to five fingers between the pelvic bones and the breastbone and a good distance between the pelvic bones (three fingers) is usually laying several eggs in a week. Poor producers and non-laying birds will only have two to three fingers capacity and one to two fingers pelvic span. As production ceases the abdominal muscles having little to support, contract, and the bird's capacity decreases accordingly to two or three fingers. Heavy breed hens give slightly larger measurements than light breed hens.

As mentioned previously the good producer is invariably a ravenous eater. Sometimes however, the greater part of the food eaten over and above that required to maintain the weight of the bird is not directed towards egg manufacture but towards the production of fat. These fat birds are either low or non-producing birds and should be culled. They are identified by the presence of thick layers of

Sketches showing approximate body measurements of a well built WHITE LEGHORN HEN in full lay.

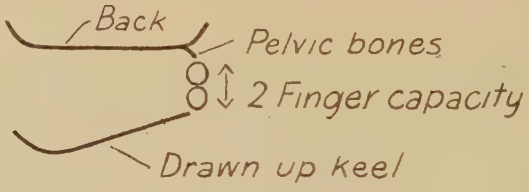


Cross Section at Middle of Body

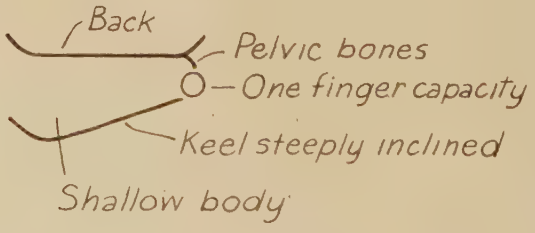


Side View

Showing reduced capacity of Low rate bird.
(1-2 eggs per week)



Showing very small capacity of bird that has been out of production for some time.



hard, rubbery fat in the abdomen as distinct from the full, soft, pliable and expansive abdomen of the high rate hen. In addition the pelvics in the over fat hen will be close together and covered with thick fat. In a laying hen it should always be possible to feed the pullard through the abdominal region. A moderately fat hen showing a soft pliable abdomen is at the time of handling quite likely producing well, but she should be watched and culled if the fat becomes hard and rubbery. A condition of excessive fatness is often seen in the heavier breeds.

1A. 1B.

See also following page.

2A. 2B.

See also following page.

3A. 3B.

Column A represents an Australorp in full production.

Column B represents an Australorp out of production.

1A.: Note full moist vent of a laying bird, while (1B.) shows the dry, shrivelled vent of the non-producer.

Again, notice the four finger capacity of the layer. The fair capacity shown in 1B. is due to the presence of surplus fat in the abdominal region. This fatty condition has prevented the abdominal muscles from drawing the breast close to the pelvic bones, so giving a false measurement.

2A. shows a good pelvic span.

2B.: The small span of a non-producer.

3A.: Clearly shows the thin, pliable nature of the pelvic bones. Note also the condition of the vent. (See 1A.)

3B.: Contrast, both thick fat formation on the pelvic bones, and dry condition of vent with 3A.

Apart from overfatness two other conditions are sometimes found in hens which result in a good capacity although the birds are not producing. The first of these is "internal laying," a condition resulting from the dropping of yolks into the abdominal cavity instead of into the oviduct. This results in the accumulation of yolks in the abdominal cavity which keep the abdominal muscles extended. The other condition that can be misleading is that of "dropsy" or "water-bag." A cyst develops in the abdominal cavity, becomes filled with fluid and can grow to considerable dimensions. The fluid can be felt through the abdominal skin. With both these conditions non-productiveness will be evident by the vent being dry and wizened and by the pelvics being practically closed (one finger).

Capacity is sometimes used in a more general and broader sense to describe the general body measurements of the bird. A high producing bird invariably has a long back. The length of the back in a good white leghorn hen should be approximately 7½in., she should also have a long breastbone, as a long breastbone is better able to support the internal organs, and displaced oviducts and internal laying are, therefore, less likely to occur. The depth of the bird or the distance between the backbone and the breastbone towards the anterior (front) end of the

body in a white leghorn hen should be in the vicinity of five inches. The back of the bird should be flat and wide with good width extending to the base of the tail. The width of the bird through the centre of its body should be in the vicinity of 5in. so that a good producing white leghorn hen has a rectangular shaped body as illustrated:—

1A. 1B.

1A. Illustrates the desirable broad flat back of a good layer (Australorp). Notice the width at the tail. But by contrast notice the narrow sloping back in 1B. (White Leghorn). Also notice the lack of width at the tail.

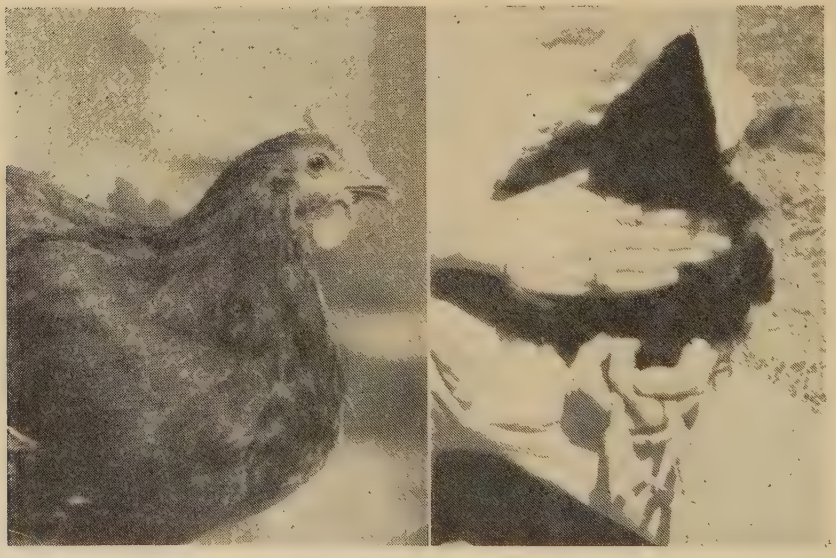
A well developed body as pictured, is fundamental to heavy laying and eggs of good size. The carcase is that of an Australorp hen which was killed while still in production. Note the backbone and breastbone parallel to each other.

The Moult.—Persistency of production is measured by the condition of the plumage during the summer and autumn. The time at which a laying hen goes into her moult is a more reliable guide as to persistency than the pigmentation changes discussed under another heading.

The hen that moults early (November-December) is the hen that has laid poorly throughout the previous laying season and is the hen that will take her time over the growing of her new feathers, i.e., she will hang in the moult and be out of production for a long period—from six to seven months. During this time the good birds in the flock are keeping this "cull" bird, and the farmer is feeding her for no return. The good producer, on the other hand, is the bird that moults late (March-April), moults for a short period (12 weeks) and comes back into production very often before the early moulting hen that has been out of production for several months.

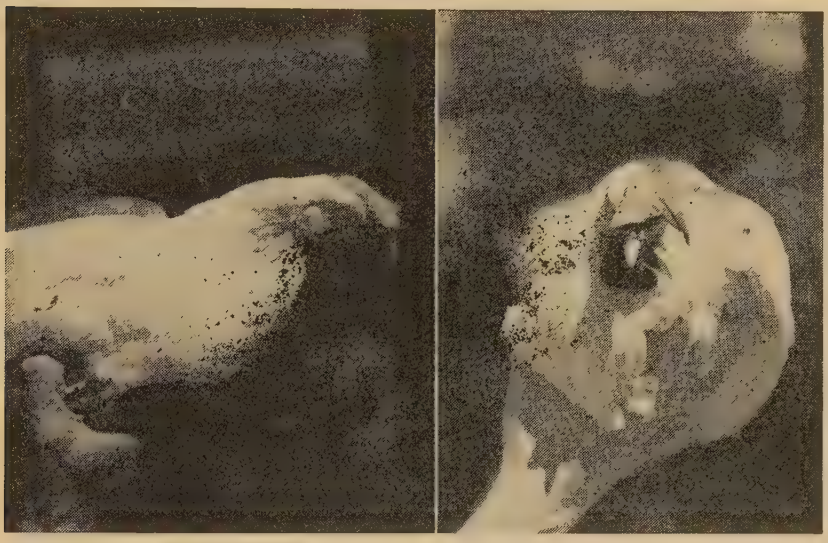
Here then, we have a body feature which is of the utmost importance and one which can be used by even the least experienced as a means of ridding the flock of birds that will never pay to keep for a further year's laying. Eleven months' continuous production is expected from pullets hatched in season so that if a flock of pullets commences to lay in March at six months of age, they should continue laying until the following February.

The old feathers are usually retained by a laying bird which lays regularly. Should she cease production for any other reason than for sickness or broodiness, she will lose her feathers.



The above bird laid 111 eggs from April to mid-October, when a partial moult took place and she ceased producing. The capacity measurement was taken 45 days after the moult commenced (see neck). The measurement was large because of excessive fat in the abdominal region. This bird is unlikely to return to production till the following June, and is therefore a liability.

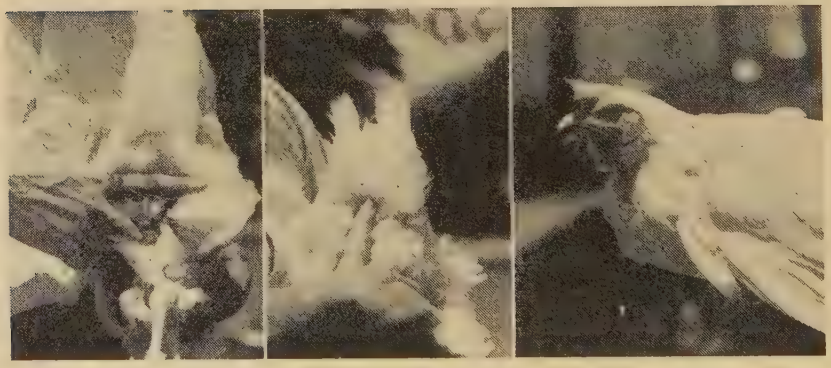
The neck moult discussed under the heading of "culling the pullet flock" is sometimes experienced by a bird without any loss of production, or by a slight loss in production. When the moult extends beyond this neck moult stage, however, the hen has entirely ceased producing. After the neck, the back loses its feathers then the wings and the body in that order. The moult seldom extends to the back without involving loss of feathers from the wings also.



These photographs are of a pullet which laid well (121 eggs) from April until November 9th, when she went into a moult and out of production. The photographs (taken November 24th) show a loss of feathers from the neck and the limp condition of the comb. This type of bird is readily recognised among a flock and should be culled immediately as it will possibly be June before she returns to production.

A few outstanding hens have the ability to moult and lay at the same time, on the other hand poor producers invariably cease production before starting to lose their feathers. Because of this, the poor-producer should be deleted before she moults by means of capacity tests, texture of the comb, and the general feel of the body, and be culled from the flock just before the last egg for the season is laid. The average time taken by a low producing hen to complete the moult is five months.

A continuous moulter is a poor producer and can be readily detected in the flock by the spotless condition of her new feathers. New feathers are easily distinguished from old feathers. The shaft of a new feather is soft at the body end, often filled with blood and sappy in appearance. The feather vane itself is close, unsplit and unbroken at the tip. The quill of an old feather is hard, hollow at the base and the shaft is filled with white pith.



Four photographs of a White Leghorn hen which tell their own story. The "wedge-shaped" body, capacity (one finger) and pelvic span (one finger) show the bird to be out of production. The "snow white" appearance of the bird's plumage, together with the loss of feathers, particularly in the neck region, suggest the bird to be a continuous moulter and a low producer.

These photographs were taken late in November, eight months after she had become sexually mature and at a time when she should have been producing many eggs per week. During the eight months she laid 27 eggs and at the time of photographing was out of production.

The observant flock owner is able to detect this type of bird a few weeks after she commences production, and if he wishes his farm to pay, he should waste no time in culling her.

This bird was selected as one of a team of birds to compete in an egg laying trial. The selection being based on the good development and excellent body features shown by the bird when she was approximately 5½ months old. This indicates the uncertainty of any one bird as a producer and the necessity for continuous, systematic culling.

This bird shows good head points and the comb is relatively full and bright. In culling this type of bird, head points, and the appearance of the comb are not reliable indications as to the hen's worth as a layer. This bird could, however, be identified as a cull bird because of her small capacity and condition of her plumage.

Birds carrying "pin" feathers are difficult to pluck. From this point of view alone, moulting, "cull" birds should not be retained on the farm until the new feathers begin to grow.

The above bird has moulted, and a new growth of pin feathers have appeared. Birds in this condition are often marketed. This is not in the best interests of the farmer or the poulterer, as birds in this condition are very difficult to pluck.

The wing feathers of a hen number approximately 29, made up of about 14 "secondary" feathers placed at the end of the wing nearest the fowl's body and separated from 10 "primary" or "flight" feathers at the other end of the wing, by a short feather called the "axial" feather. About four small "finger" feathers are situated at the extreme tip of the wing. The rate at which the "primaries" grow can be used to differentiate between the rapid and slow moulter. Primary feathers moult in numerical order starting from the feather nearest the axial feather and ending with the primary nearest the wing tip. Poor layers moult slowly and drop one primary feather at a time. Rapid moulters on the other hand sometimes drop two or more primary feathers together, and the replacement feathers will grow at equal rates so that this type of bird when handled will show two or more growing primaries of equal length. Birds of the latter class are invariably late moulters showing them to be persistent layers. Rapid moulting is not only seen in the wing feathers of good producers but also in the loss of the body feathers generally. Because of this it is common to see a late, rapid moulting hen practically devoid of feathers and showing many bare patches over her body. In years gone by, because of her dishevelled appearance, this type of bird was discarded. This is not the practice today, however, as the worth of this type of bird is appreciated by the average farmer.

The Comb, Wattles and Earlobes.—The development and the functioning of the reproductive or egg producing organs is accompanied by an increased blood circulation in the comb, wattles and earlobes. This is evidenced by the large, full, glossy appearance of these parts in the laying hen and are most noticeable when the pullet is at the height of her production. This gloss and prominence is lost as the laying season advances. Near the close of the laying season, although the redness is retained, the comb in particular, as it is the most prominent organ of the three, loses its fullness, becomes wilted and reduced in

size. When production ceases these parts become small, contracted, dry and usually covered with a white scale. They are cool to the touch which suggests reduced blood circulation and a dormant condition of the egg producing organs.

The feel of the comb, which is known as "comb texture" gives a further guide as to whether a fowl is in production or not. The hen that is laying many eggs in the week has an increased blood circulation through the comb and will have a comb which feels like the "lobe" of the human ear. It is supple yet firm, pulpy yet strong, soft inside although it may be rough outside—such a comb denotes a "fine texture." The non-producing fowl on the other hand or the hen that is laying a few eggs in the week will have a comb which feels hard (inside) to the touch—one which feels like the brim of a felt hat—has no pulpiness and no body—such a comb has a "coarse texture." Between these two extremes of fineness and coarseness a wide range of different intermediate "feels" are to be found in birds showing intermediate rates of lay, but in culling laying hens little attention should be taken of these intermediate "feels" and "comb texture" should only be exploited when determining between high and low producing birds. When examining birds at the end of the laying season "comb texture," as indicated by a hardening of the comb, indicates the nearness or otherwise of the last egg for the season, e.g., laying hens which when examined in December-January can be said to be rapidly nearing the completion of their seasons lay, if in addition to a reduced capacity and excessive fatness, they show a hardening of the comb (coarse texture).

It should be noted, that pullets generally have finer textured combs than hens. This applies to birds both in and out of production. In the writer's opinion "comb texture" as a guide to productiveness is of greater value when applied to light breed hens such as the White Leghorn than when applied to Heavy Breed hens, and Crossbred (W. L. x Aust.) hens which naturally have harder combs.

These photographs show a hen that has been out of production for some time (left), a hen in full lay (centre) and a hen that has just ceased production (right).

The bird on the left has a hard textured, shrivelled up comb. The centre bird has a soft textured, full bright red comb. The bird on the right has a comb which has lost its turgidity and become limp, just before commencing to shrivel.

If a bird is to be culled it should be discarded just as the comb loses its fullness and becomes limp as in the case of the bird on the right. A bird in this condition if not already out of production soon will be and will not have lost very much weight. The bird on the extreme left on the other hand should have been marketed weeks before her photograph was taken (late November). Since ceasing production she has eaten much valuable food and her carcase value has decreased because of her lost condition.

Good head left and poor head right. The bird on the left laid 305 first grade eggs in 336 days. Note the refined, deep, well balanced head, well developed comb and wattles, bright bold eye and strong beak of this bird. Compare with the poor head of the bird on the right which suggests the bird to have a weak constitution. This bird has a long head ("crow headed"), and a long, weak looking, hawk like beak. The eye is dull and sunken, and the comb and wattles poorly developed. The head points would, in themselves, provide sufficient reason for culling this bird.

It is very difficult to describe tactile sensations without demonstration. The farmer should therefore arrange to be shown the correct way to determine comb texture. Comb texture does not refer to the outside appearance or feel of the comb so much as to the inner feel, experienced when the comb is grasped firmly between the thumb and the forefinger.

Fine texture in good birds and coarse texture in poor producers is not confined to the comb but is evident throughout the bird from its head down to its shanks, which in a good bird are lean and flat sided, and not round and thick with coarse scales.

The Structure of the Skull.—It is doubtful if head points alone are sufficiently reliable to be used in determining between profitable and unprofitable birds. It is rarely, however, that a hen showing a number of very good head points lays few eggs and when considered in conjunction with other body features, "head points" do provide a guide as to the worth of a bird as an egg producer. Head points are particularly valuable in ascertaining the "vigour" of a bird. Some of the more important head points found in good producing hens are:—

1. The top of the skull should be flat from side to side with the eye set well up towards the comb.

2. The width of the skull should be maintained between the eye and the base of the beak.

3. The distance from the top of the head (base of comb) through the eye to the base of the wattle should be nearly as great as the distance from the front of the lobe to the point of the beak. Birds with long narrow heads and long narrow beaks are termed "crowheaded." This type of bird usually lacks vigour as indicated by a small body, tapering backs and the laying of small eggs.

4. The skull from the front to the rear should be level on top. The "skull line" should be a gentle curve and should not rise to an apex over the eye forming the so called "gable" head. A "gable" head is frequently found in poor layers that are fat and beefy.

5. A clean cut face free from feathers with prominent bright clear eyes and an absence of wrinkled skin about the head is a mark of good quality.

Disposition and Temperament.—The good layer is usually friendly, tame, alert, active, always busy, among the last to take to the roost and the first off in the morning. Her appetite is always good as shown by her full crop at night. A good hen running on hard ground usually has worn toenails.

Culling Growing Chickens.—Chickens should be culled at the time they are taken from the hatching tray and before they are placed under the brooder. This is one of the most important times to cull. It gives the farmer his first opportunity of partially relieving himself of future financial worries and he should avail himself of it.

Inferior chicks are often retained and reared to an approximate age of six months before the farmer is convinced that they will be unprofitable. When reared to this age the temptation to carry the inferior pullets for a further few months in the hope that they will lay a few eggs is very great. Unfortunately these hopes never materialise and the money spent in rearing and feeding, not forgetting the labour involved can never be recouped. What a saving it would have been had these birds been culled when a few days old.

By the end of the 21st day of incubation the chicks should be out of the egg and completely dried off. It is bad policy to give weaklings a chance to survive even for a few days. Weakly chicks which result from faulty incubation, from constitutional weakness in the breeding stock, or from faulty feeding of breeding stock will never develop into profitable birds. They only serve to jeopardise the health of normal chickens in the batch, insofar as the most important chicken diseases are highly infectious or contagious and weakly chicks readily succumb to these diseases should they appear.

To be successful in poultry farming, the farmer must buy good quality stock. An extra pound per hundred for day old pullets bred from stock he knows to be reliable compared with chicks from stock indiscriminately mated is well worth the extra outlay. It is in the hatchery mans own interest to consign healthy, evenly developed chicks to his clients. If however, weaklings can be found amongst bought chickens, and it must be remembered that weaklings can result from matings of first class stock as well as from matings of inferior stock, these should be destroyed immediately.

In culling chickens, a general survey of the batch will give a clear picture of the average size of the chicks and any weak or undersized chicks can be easily detected. The chicks should be a ball of fluff and have plenty of body. Evidence of sticky patches on the down indicates too high a humidity during the incubation period. Chicks subjected to these conditions often have difficulty in hatching but under no circumstances should a chick be assisted out of the shell. A chick that cannot get out of the shell as a result of its own efforts is not worth keeping.

Individual examination may indicate chickens with crossed beaks, weak legs, very short abdomens or other deformities. The absorption of the yolk sack should be complete with the opening completely healed over. Similarly, the vent should be clean and those chicks showing pasted up vents should be destroyed. The eyes should be bright and the beak and shanks of yellow coloured breeds full of pigment. The beak and shanks of white skinned birds should be tinged with pink.

The chicks should be grown gradually so that light breed pullets commence laying at six to six-and-a-half months of age and heavy breed pullets at six-and-a-half to seven months of age. Constant culling should be practised during this time and any chicks which lag in growth behind the average of the flock should be culled. Chicks of the same age should be run together and under no circumstances should "runts" of one group be removed to a group of younger chicks. These "runts" will never grow into profitable hens. When not of a genetic nature the stunting is frequently the result of worms, pullorum or coccidiosis, and to introduce these potential havoc-causing "culls" into a group of clean, evenly grown, well developed chicks, is sheer folly.

Growing pullets can be selected for future production with a greater degree of certainty when they are 15-18 weeks of age than at any other time. Pullets which show the greatest development at that age become the best layers, everything else being equal. Those pullets that feather quickest usually develop into the best layers.

A.

A. shows an evenly grown flock of leg-bar pullets.

B.

B.: Contrast an unevenly grown flock with A. Notice the two "culls" in the white flock.

The isolated "cull" birds (marked X) can easily be seen amongst the birds in this flock of well developed, 4-months-old Australorp pullets. (Photos taken late November.) It is unlikely that these poorly developed pullets will ever be profitable hens. Should disease come along they will be the first to contact it. The pullet in the left foreground has raced to maturity to the detriment of her body size. When she commences laying she will probably lay many small eggs. After being in production for several weeks she may go into a neck moult and cease producing for some weeks.

Culling the Pullet Flock.—Before discussing this aspect of culling there is a point in management which must be brought to the reader's attention as it is of the utmost importance to the welfare of the pullet flock. Pullets in the first few months of lay are very susceptible to even the slightest change in management or feeding and should laying pullets be moved to new quarters or be fed a different ration production might easily drop from 40 per cent. to 15 per cent. within a few days and this will quite likely be accompanied by a general neck moult which may develop into a body moult. If this occurs several weeks' production will be lost at that period of the year (April-May) when egg prices are at their peak. Because of this the pullets should be moved from the rearing yards to the laying sheds three to four weeks before the first egg is dropped.

The ideal time for a pullet to lay her first egg is between 180 and 215 days of age. Light breed pullets should commence laying between the age of 6 and 6½ months and heavy breed pullets which should take slightly longer to develop. 6½ to 7 months.

Very early laying is undesirable, as once egg production commences body development is very much slowed down. A bird must have a good body if it is to withstand the strain of high egg production later on. Conversely very late laying is undesirable because delayed sexual maturity goes hand in hand with poor annual production.

Assuming that the least developed pullets have been culled from the flock at the 15-18 week old stage there should be only a few birds to discard at the time the pullets are transferred to the laying sheds. Even though the management and feeding be ideal most farmers find that some of their pullets go into a neck moult

shortly after commencing production. In these birds the pigment returns to the vent, eyelid, etc., and the bird takes a holiday. If the percentage of pullets that develop the neck moult is small it shows that these particular birds are just not built for egg production and the quicker they are marketed the better.

Even pullets which show first class body features and are well developed when five to six months old may break down after being in production for a short time or fail to develop into profitable hens. Support to this statement is given by the relatively high percentage of birds which after being selected as competition birds in egg laying trials break down, fail to develop, and become unprofitable during the course of the trial. It is, therefore, important to keep a particularly watchful eye on the pullet flock until June or July. Birds which warrant retention until this time of the year should have little trouble in holding their own (providing of course disease does not intervene) until the fowls with poor persistency begin to show their colours in late October. From then until February the pullets will require heavy culling as they go out of production. With experience birds can be detected before they actually go out of production, and every poultry farmer should aim at acquiring this ability to detect those birds that are nearing the end of their laying season. Those that cease production during October-November-December should be automatically disposed of, so that the percentage production during November-December does not fall below 50 per cent. and during January and February 40 per cent. and 33 per cent. respectively. More sympathetic consideration should be given to those that cease production during February. Taking into consideration the mortality of the pullets and the suggested rate of culling, approximately one-half of the original birds in the pullet flock should be retained to commence the second year's production and these should consist of late moulting pullets. To ensure satisfactory production during October-January a monthly night culling of the flock is recommended during these months.

The "breakdown" involves not only cessation of egg laying but very often rapid loss of weight. The heavy mortality experienced at this time of the year is taken for granted by the farmer who does not take heed of foreboding signs which tell him to cull, and cull quickly. A week wasted at this time of the year can easily mean the difference between a carcase which returns 6s. or 7s. and a corpse which is valueless.

A percentage of the pullets will show signs of becoming coarse during December and January after the flush laying season. This is particularly evident in flocks of heavy breed and cross bred hens. A coarse hen is typified by having a skull which is wide across the top and deep above the eye, with overhanging eyebrows, small sunken eyes, a large comb of coarse texture, wrinkled face carrying plenty of feather, and very thick pelvic bones covered with fat. Such a fowl will be heavy and inactive. Because of excessive fat carried in the abdominal cavity, the abdomen will feel hard and ridgy to the touch.

The habits of the birds and a number of different body features when taken individually or collectively serve to identify the "cull" bird that ceases production after 8-10 months laying. The most important of these features are:—

1. Reduction in capacity to two fingers.
2. Reduction of pelvic span to one finger, and the pelvic bones becoming rigid.
3. Thickening of the pelvic bones because of the deposition of fat on them.

4. A thickening, hardening, shrivelling or apparent wasting in the abdominal region. Heavy breed hens very often become excessively fat as they cease production and the fat is noticed particularly in the abdominal region, where it forms a hard layer beneath the skin. In this type of bird the pelvic bones are also invariably covered with fat. This abdominal fat prevents the abdominal muscles from drawing the breast bone towards the pelvic bones and consequently a "false capacity" is shown by such birds, which also weigh heavy and usually have heavy overhanging eyebrows, a coarse head and roughly textured combs.

   Many birds on the other hand and particularly light breed hens, show lightness, signs of wasting away and frequently a whitish-greyish diarrhoea. This condition is commonly referred to as "going light." There is no cure for it and the quicker these birds are marketed the better. They will never regain weight and very often die if held for two to three weeks. Broody birds that have been on the nest for any length of time often lose weight. This lost weight will be regained by the bird after a period in the broody coup.

5. A contraction, shrivelling and drying of the vent which becomes round instead of crescent-shaped.

6. A shrivelling of the comb which becomes pale and covered with a whitish scale. The comb becomes coarse in texture and the wattles and lobes inconspicuous, rough and dry.

7. In yellow-skinned birds, pigment returns to the vent, eye ring, ear lobe, beak and shanks in that order when production ceases.

8. The early moulter invariably ceases production before moulting commences so that the farmer should not wait until the fowl moults, but should look for other features in the early moulter, which denote the fowl to be out of production.

The Time of the day in which to Cull.—Day-old chicks should be culled whenever they are taken from the hatching trays.

Daylight culling of growing chicks and the selection of breeding stock for type is more convenient than night culling, but with the laying hen, in addition to day culling, night culling is advocated.

During the summer months laying birds go out of production daily. To be able to recognise the pullets and hens when they go out of production during October, November, December and January, is one of the most important aspects of culling.

The bird that shows aloofness, sluggishness and a reluctance to eat (particularly the morning wet mash) will also show a shrivelling of the comb and can be assumed to be out of production. She should be caught with the least possible disturbance to the other birds in the flock (a crab net is very useful for this purpose). It will be noticed that her comb is thin, hard to feel, and that she has a small abdominal capacity.

When some birds go out of production however, they do not immediately show signs of having done so and it is only by handling these birds and noting their reduced capacity, curved in pelvic bones, excessively fat condition, coarseness, tightness of the abdominal skin or marked loss of weight, which tells that they are out of production or are likely to be in the very near future. Because of this, monthly

night inspections of the roosting hens is advocated during the early summer months. The light from a hurricane lamp will give all the light that is necessary and handling of the birds without the aid of any light at all is usually sufficient for the operator to make a decision. The operator should work up and down the perching birds in a systematic manner so that no bird is missed. The capacity shown by the bird, the feel of the abdominal region, the feel of the crop, the condition of the pelvic bones, the width of the pelvic span and comb texture should be noted.

Considerable speed can be attained by the experienced night culling operator as the general feel of the fowl's abdominal region will usually provide sufficient information for him to confidently judge the majority of the birds without lifting them from the perch.

An early evening examination of roosting birds that have been given a liberal feed of grain just before going to roost will, by the relative fullness of their crop, give useful supplementary information as to whether they are out of production. The crop should be felt with one hand and the abdominal region with the other. The bird that is out of production will have little in its crop in addition to a small capacity and tight abdomen. On the other hand, the bird that is in full lay will invariably show a full crop. However, so will the hen that is using its food (particularly grain) to produce fat and not eggs. This fatness will be detected at the rear end of the bird.

Night culling of laying hens at the end of their laying season is quick, and little effort is expended by the operator. The laying hen is a very sensitive piece of mechanism and night culling when quietly, yet efficiently carried out does little to upset this mechanism.

Clearly the above bird is a "cull," and a liability to the flock. After laying satisfactorily for only eight months (March-October), she is now resting, as evidenced by the shrivelled appearance of the comb and the clean, new nature of h r plumage. This bird will probably not return to production until June. She will therefore be a flock passenger for the intervening eight months.

SELECTING BREEDING FOWLS.

Selecting the Breeding Male.—The true worth of a male as a breeder is measured by his ability to transmit high egg-producing qualities to his off-spring. This can only be accurately determined by means of the progeny test. This test consists of mating a male with a number of females and keeping a record of the eggs laid by the daughters, egg-size, economic use of foodstuffs, broodiness etc. Pullets with high winter (first few months of laying) production as a rule give good yearly production and by recording the egg production of pullets during the winter period pre-potent sires can be selected and used as breeders in the following breeding year. In this way a breeding seasons use of a valuable cockerel is not lost.

If vigour is to be maintained in poultry flocks the first requirement to be looked for in a breeding cockerel is this essential. Lack of vigour is seen in cockerels with small body size and comb development, cow hocked, drooping rumps etc. The cockerel with vigour is alert, active, very often savage, and of a commanding disposition. He will have a short well-curved beak, broad deep head and a full face with a prominent clear bright eye. The comb face and wattles should be of a healthy red colour. The neck should be reasonably short and arched, the legs of medium length and set squarely under the body with hocks straight and wide apart. Pronounced masculine features should dominate all sections of the bird, even to the bright sheen on the plumage. He should conform to type. The breast should be prominent, he should have wide shoulders and good depth from the centre of the back to the centre of the keel. The reproductive organs are not developed as they are in the actively laying hen, and in well-bred cocks the tip of the keel slopes up giving a small capacity. The pelvic bones are close together. A bird with a crooked breastbone or showing thumb-marks or side-sprigs on the comb, should not be used for breeding purposes.

Precocious males usually show good fertility, but are likely to be fine boned and undersized for the breed. Continued use of early maturing males may therefore have a tendency to reduce the size of the offspring, and will eventually affect the size of the egg.

A senior officer in the United States Department of Agriculture claims that egg production in the United States increased more between 1935-1942 than during the previous 25 years. He attributes this to the increased use of breeding males from lines of high producing ancestry that are able to transmit high egg producing ability to their daughters. When these progeny tested males are mated to females which have proved themselves good layers we can expect maximum improvement in egg production.

Selecting Breeding Females.—High egg production has been shown to depend largely upon five inherited characters: early maturity, high intensity or rate of lay, non-broodiness, no winter pause, and persistency or ability to lay over a long period. Persistency is the most important of these characters and fortunately is the most accurately determined by culling methods.

Early Maturity.—Very early maturing pullets which show small body size and very slow maturing pullets, should never be used in the breeding pen. In selecting birds for early maturity the pullets should be handled at six-and-a-half months of age. Those with a large moist vent, enlarged soft pliable abdomen, a wide pelvic arch and good capacity should be leg banded and regarded as

possible future breeders. Generally speaking those pullets which commence laying between the ages of 180-215 days will give the greatest first year production.

High Intensity.—High intensity or ability to produce many eggs in a week is measured by capacity, also by the feel or quality of the skin and abdomen, and by the thickness of the pelvic bones. Fat goes out of the body with production so that a heavy producing hen a few months after she has come into production will have a soft velvety skin, soft pliable abdomen, and thin pelvic bones. A bird showing these good qualities should be leg banded with a band of a different colour than that denoting early maturity.

Broodiness.—Broodiness is opposed to egg production and is inherited. Fowls which show signs of broodiness should never be used in the breeding pen. This is a particularly undesirable feature in light breed hens and the White Leghorn hen owes much of her egg producing ability to the low incidence of broodiness found in this breed. When broodiness is considered strictly in the light of egg production we can generalize by saying that hens showing a high incidence of broodiness are low producers and birds which repeatedly go broody should be culled from the laying flock. It is frequently found, however, that two or three periods of broodiness in a laying season are shown by high producing hens. In such hens rate of laying is usually accelerated immediately following a broody spell and some of the lost production time is thereby recouped.

The economic loss caused through broodiness is largely in the hands of the farmer. In the first place he should breed against it and secondly he should isolate broody birds at the first sign of broodiness. Should a broody bird be left in the nest for a number of days, five or six weeks production may be lost, but if a nightly inspection of nests is made and broody birds are removed to the broody coop immediately, only 12-15 days production will be lost.

Winter Pause.—Winter pause in production is usually accompanied by neck moulting, closing of the pelvic arch, hardening of the abdomen and in yellow skinned breeds by a return of pigment to the vent. beak, etc. Pullets hatched in season that receive good management should not show winter pause. Those that do should not be used in the breeding pen.

Persistency.—Persistency is the most important single factor concerned with high egg production. The highest producers of the flock can be identified with a high degree of accuracy by examining the birds for persistency and supplementing these examinations with those for high intensity.

Hens in their first year of lay should produce for 11 months and highly persistent birds will lay for 12 or more consecutive months. High producing birds after 11 months' production will carry their old feathers in the wings and throughout the body, will have a large moist vent, bright full comb and will not be carrying pigment in the beak, shanks, etc.

In selecting fowls for the breeding pen we should not base our selection on egg production alone but should select those birds that have laid at least 200 2 oz. eggs in their pullet year an dwhich also showed good body development and weight at the time they became sexually mature, i.e., at the time they laid their first egg. This is important if we wish to maintain body size in our flocks of the future.

One way in which mismanagement can cause a serious loss of production is through leaving broody hens on the nest and thereby allowing the body to shrivel and the reproductive organs to fall into disuse. Result: An extended broody period of 5-6 weeks and no eggs. These photographs are of a broody Australorp hen that was left on the nest too long. The pelvic bones have practically closed and the capacity has been reduced to two finger widths. If this bird had been removed to the broody coop on the first night of showing signs of broodiness the bones would not have closed and the hen would probably have been back in production within 10-15 days.

Birds that are selected for the breeding pen must have health (including freeness from Pullorum disease), vigour, size and trueness to standard type and colour. Hens which "lay themselves out" are of no use in the breeding pen and should be disposed of after finishing their laying season. The breeding hen should be the high producing hen that maintains physical condition.

Egg Size.—If the farmer wishes to maintain egg size in his flock he should trap nest his potential breeders at the time they commence laying in their pullet year. He is thus able to identify and leg band any pullet that does not lay a 2 oz. egg by the time she has laid her 20th egg. Such a pullet should never be used in the breeding pen as egg size is hereditary. A pullet that lays underweight eggs very often lays eggs weighing 2 oz. and over after she has passed through her first moult. Such a hen may be a good producer, even though she lays small eggs and be retained in the flock after her first year lay because of the number of eggs she lays. If appropriately leg handed, however, there is no possibility of her being used as a breeder in her second or subsequent years of laying.

CULLING CHART.

Judging for Present Production.

Character.	Laying Hen.	Non-Laying Hen.
Vent	Large, dilated, oblong, moist, bleached.	Small, contracted, round, dry, pigmented.
Pelvic Bones	Flexible, thin and wide apart	Rigid, coarse, close together
Comb	Large, red, full, glossy	Small, pale, scaly.
Wattle and Lobes	Prominent, soft, smooth	Inconspicuous, rough and dry.

Judging Past Production.

Character.	Long Laying Period.	Short Laying Period.
Vent	Bluish, white, bleached	Flesh coloured.
Eyelids	Thin and edges white	Thick, yellow tinted.
Eye	Prominent, keen, sparkling	Listless, sunken.
Earlobes	Enamel white	Yellow tinted.
Beak	Pearly white	Yellow tinted.
Face	Clean cut, sunken	Full, wellfleshed, yellowish.
Shanks	White, flat, thin, creased	Yellow, round, smooth.
Plumage	Worn, soiled, lifeless, close-feathered	Signs of moulting, loose-feathered.

Judging Rate Production.

Character.	High rate.	Low Rate.
Keel	Slopes downward	Slopes upward.
Pelvic Bones	Tips thin, point straight out	Tips thick, curved in.
Capacity	Four to five fingers	Two fingers.
Abdomen	Soft, pliable, dilated	Fatty, hard, contracted.
Rump	Broad, width carried back	Narrow, cramped.
Lateral Processes	Prominent, pointed outward	Hard to find, pointed inward.
Skin	Soft, thin, loose, silky	Thick, dry, underlaid with fat.

ACKNOWLEDGMENT.

Thanks are due to Mr. C. Balmer (Govt. Photographer) for the photographs for this article.

THE SHEEP ITCH MITE (PSORERGATES OVIS).

C. R. TOOP, Acting Chief Veterinary Surgeon,
Department of Agriculture.

THE sheep itch mite *Psorergates ovis*, was recorded in Western Australia for the first time a few weeks ago. This parasite was first detected in New South Wales in 1940 and since that time it has been reported from all of the other States. There is reason to believe, however, that the mite has existed in Australia for many years and that its recognition has been delayed owing to the similarity of the symptoms produced to those resulting from infestation with body lice (*Bovicola ovis*). The presence of itch mite had been suspected for some considerable time in this State, but a definite diagnosis could not be made until the parasites were recovered from affected sheep and positively identified.

The Sheep Itch Mite (*Psorergates ovis*—female).
(Photo.: C.S.I.R.)

The itch mite inhabits the superficial layers of the skin setting up a chronic irritation which causes the affected sheep to rub against fence posts and other objects and to bite at the wool, so that the fleece presents a torn and ragged appearance and in advanced cases becomes badly cotted and consequently reduced in value. The itch mite is not visible to the naked eye and its presence can only be detected by the microscopic examination of scrapings taken from the skin after the wool has been closely clipped or shaved.

Lime-sulphur dips have proved effective for the control of the parasite, and it has been shown that a single dipping if carefully carried out will completely eradicate the infestation.

The condition has so far only been observed in merinos.

An advanced case of itch mite infestation. Note the torn and ragged appearance of the fleece and the loose tassels of wool hanging from the flanks and hindquarters.

(Photos.: Government Photographer)

Symptoms.

The symptoms of itch mite infestation are very similar to those produced by body lice (*Boricola ovis*) and a careful examination is necessary in order that the two conditions may not be confused.

In consequence of the irritation caused by the mites there are symptoms of rubbing and biting at the wool so that the fleece becomes torn and ragged and loose tassels of matted wool may be observed hanging from the sides, flanks and thighs. The degree of irritation appears to be mild and it may be necessary to watch sheep at rest in the yards very closely before any rubbing or biting is observed. Occasionally strands of wool may be found adhering to the teeth or twisted round the horns and evidence of rubbing may be found on fence posts, logs and trees in the paddocks.

The same animal viewed from the rear. Note the broad band of wool along the middle of the back which the animal is unable to reach and which appears to be unaffected. The tassels of loose wool hanging from the thighs are very obvious.

(Photo: Government Photographer.)

The earliest symptom of the condition consists of a small whitish patch on the side or flank, from which the infection spreads in all directions but more commonly towards the hindquarters and over the thighs. The infestation apparently spreads very slowly and three to four years may elapse before the condition becomes generalised.

The affected wool becomes stringy in appearance and has a dry spiral-pointed tip. It contains particles of crumbling scurf and may show a slight yellow discolouration. The staple is tender and can readily be broken anywhere along its length. In advanced cases the wool becomes badly cotted and the fibres can be torn apart only with difficulty. Sheep in this condition may be difficult to shear and the value of the fleece is seriously depreciated.

Course.

The spread of itch mite infestation is slow and insidious and several years may pass before it reaches serious proportions in a flock; thus on some properties a few sheep only may be observed to be affected whereas on others up to 20 per cent. may show evidence of infestation. In one flock, which was kept under observation in New South Wales, 15 per cent. of the sheep were found to be affected after a period of eight years.

A sample of the affected wool.
(Photo.: Government Photographer.)

Sheep of all ages may become affected, but owing to the slow rate at which the infestation spreads, it is most frequently observed in older animals, amongst which the most serious cases are always found.

The condition is believed to be spread by the direct contact of infested with non-infested animals and to take place soon after shearing while the wool is short which favours the migration of the parasites. The migration of the mites from woolly sheep appears to be unlikely.

Diagnosis.

When, in the absence of lice, there are symptoms of rubbing and biting with consequent damage to the fleece, itch mite infestation should be suspected. The presence of lice must always be excluded, but this should not prove difficult since these parasites, although small, will readily be detected when the fleece is opened and examined in bright sunlight.

For the detection of itch mite the microscopic examination of skin scrapings is necessary. The mites are not always present in large numbers, and the examination of a number of scrapings taken from different sites on the body may be necessary before a positive finding is obtained.

When the condition is suspected and confirmation is desired, a sheep showing typical symptoms should be forwarded to the Department for examination.

Control.

Experience in New South Wales has shown that itch mites may be controlled by the use of lime-sulphur dips, and, provided it is thoroughly carried out, a single dipping may completely eradicate the infestation from a flock. Dips containing 1 per cent. polysulphide sulphur are employed and these may be prepared from concentrated lime-sulphur solutions now available on the market and commonly used as orchard sprays. These concentrated lime-sulphur solutions usually contain 20 per cent. polysulhpide and when used in a dilution of 1 in 20 will provide a solution of the required strength for dipping. To this must be added a wetting agent such as Agral 3 in the proportion of six ounces to 100 gallons, which will ensure that the dipping solution penetrates and thoroughly wets the fleece. Best results will be obtained by dipping three to four weeks after shearing while the wool is still short, but since lime-sulphur solutions are very irritant to open wounds, treatment should not in any case be undertaken until shear-cuts have completely healed.

The dips in general use for the control of tick and lice in sheep are not highly effective for the control of itch mite. Observations have shown that while both arsenical and rotenone dips will destroy large numbers of mites on affected sheep, they will not eradicate the infestation from a property.

There is some reason to believe, however, that gammexane dips may provide an effective means of control, but until confirmatory evidence is obtained no definite recommendation can be made.

PRE-HARVEST DROP OF APPLES AND PEARS.

By W. P. Fears, Horticultural Instructor.

MANY apple and pear growers have been, and still are, very much concerned over the very serious losses they incur from fruit that falls from their trees just before and during the harvesting period.

This pre-harvest drop is particularly noticeable in such varieties as Jonathan, Delicious and Cleopatra apples and Bartlett pears.

Spraying carried out in the orchard during the past season using commercial pre-harvest sprays containing alpha napthalene acetic acid—a growth-promoting substance—successfully prevented the drop of a major portion of the crop of Bartlett pears and Delicious apples. Experiments carried out at Donnybrook and Mt. Barker in 1944 showed that the pre-harvest loss of both Jonathan and Delicious apples was reduced to a low figure by the use of "Phyomone" and "Cling Spray," while overseas work has fully demonstrated its effectiveness on various varieties of apples and pears.

Growers suffering loss from this cause may, therefore be interested to try these sprays, which are marketed under various commercial trade names. In this instance "Firmstem" and "Phyomone" were used, but other lines such as "Fruitone," and "Shellestone" may be used in the same way.

At Illawarra Orchard, Karragullen, where an average crop of Bartlett pears would be between 3,000 and 4,000 bushels, all trees, with the exception of three, were sprayed with "Phyomone" approximately 19 days before harvesting was due to commence. All falls were left on the ground until harvesting was completed, when they were gathered and the losses determined.

An average of between 12 and 13 pears was lost per tree from sprayed trees, as against 250-300 fruits per tree for unsprayed trees. The additional fruit retained on sprayed trees was, therefore, in the vicinity of two cases per tree.

I am indebted to Mr. H. Price for details of the work which he carried out on his orchard. As a result of the success attained with the "Phyomone" spray, this grower intends to adopt the same procedure in the coming season.

Tests carried out with "Firmstem" on Delicious apples on the property of Mr. DiMarco at Karragullen demonstrated that a considerable saving of fruit was effected on trees which were prone to pre-harvest drop. The spray was applied on 2nd March, but from results obtained it appears that, if the spray had been applied a week earlier, the losses may have been further minimised.

As satisfactory results from the use of these sprays can only be obtained if the stem of the apple or pear is contacted by the liquid, it will be readily seen that pears with their long stalks lend themselves to this treatment.

In the case of the apple with its shorter stalk and different shape and habit, it is more difficult to spray the stem of the fruit, but with care and a good spray pressure, it can be done on properly thinned crops, and a distinct saving of fruit results.

Although the treated fruit hangs on the tree longer and the general colour is improved, the ripening process is in no way retarded by this spray, and therefore, care is necessary to ensure that the fruit is not allowed to become over-ripe on the tree before picking.

NOTES ON THE TREATMENT OF MASTITIS.

By C. R. Toop, Acting Chief Veterinary Surgeon, Department of Agriculture.

WHILE it is important that the dairy farmer should be able to successfully treat cases of mastitis as they arise it is still more important that the means available for the control of the disease should be effectively applied. Although many advances in treatment have recently occurred, there is still no medical agent that can be relied upon to cure all of the cases of the disease which occur. Some forms of mastitis are amenable to treatment but others will not respond to treatment of any kind. It is therefore essential that unremitting attention should be given to the application of measures designed to prevent the spread of infection from animal to animal and the more efficiently these can be applied, the fewer will be the cases of the disease it will become necessary to treat. Our knowledge of mastitis is still far from complete and even when all of the known preventive measures are thoroughly applied some cases are likely to occur and will require prompt attention.

The earlier treatment can be undertaken the better will be the prospects of success and the less will be the damage inflicted upon the udder tissues by the infection. In its simplest form the treatment of mastitis consists of the frequent and thorough stripping out of affected quarters together with fomentation with hot water and massage with a stimulating liniment such as camphorated oil or some similar preparation. Beneficial results are frequently obtained from treatment of this kind. These results, however, are frequently more apparent than real for although the signs of inflammation may subside and the milk regain its normal appearance, the infection may persist in the quarter. This is particularly the case with chronic streptococcal mastitis wherein the infection once it has become well established usually persists throughout the life of the animal, often to flare up periodically and to inflict irreparable damage upon the udder tissues, slowly but surely impairing the function of the quarter, reducing the milk yield and finally causing it to dry up completely.

It is obvious then that any form of treatment, in order to effect a permanent cure, must succeed in destroying the infection within the udder itself. The means whereby it has been sought to bring this result about have broadly consisted of:—(a) the administration of drugs by the mouth, which, during their excretion through the milk will destroy the infection in the udder. (b) The injection of bactericidal solutions or suspensions into the udder through the teat duct which will come into contact with the organisms causing their destruction. Of the drugs which may be given by the mouth none may be regarded as highly effective. A few years ago the administration of sulphanilamide was frequently advocated, but the results in the main were disappointing and the cost of the treatment is such that it cannot be recommended.

Amongst the solutions that may be injected into the udder through the teat duct probably the best known are the acridine derivatives acriflavine and entozen. Both have given good results in the treatment of chronic streptococcal mastitis. Recently penicillin solutions have been quite extensively employed, but since they have now been supplanted by the much more convenient and equally effective suspension, it is unnecessary to describe the method of their administration. Of the suspensions, sulphanilamide-in-oil and penicillin suspension need only be mentioned.

Sulphanilamide-in-oil.—This is a 38 per cent. suspension of sulphanilamide in mineral oil. A dose of 40 ccs. (approximately 1½ fluid ounces) is used and the treatment is repeated each day for four days; the dose being left in the udder until the next milking. The injection may be made by means of a two ounce metal syringe fitted with a short length of rubber tubing and a teat

siphon, all of which should be sterilised by boiling before use. The quarter should be stripped out before treatment and the teat end swabbed with methylated spirits before the siphon is passed through the teat duct.

Experience in the field has shown that sulphanilamide-in-oil has an efficiency of about 50 per cent. in the treatment of streptococcal mastitis but is very much less effective against staphylococcal infections. In cases where a satisfactory response is not obtained the dose rate may be increased to 80 ccs. and a further series of four injections given. Now that penicillin suspension has become available sulphanilamide-in-oil finds little favour with the dairy farmer.

Penicillin Suspension.—For the treatment of mastitis penicillin has proved much more effective than any therapeutic agent that has so far become available. It can usually be relied upon to cure 80-90 per cent. of cases of streptococcal mastitis, but it is not effective against staphylococcal infections. When it is considered, however, that about 80 per cent. of all cases of mastitis result from infection with streptococci and that less than 20 per cent. are of staphylococcal origin, the value of the drug to the dairying industry will be apparent.

Penicillin is now available in the form of a suspension which is put up in collapsible tubes fitted with a nozzle which may be inserted into the teat duct enabling the drug to be injected direct from the tube into the affected quarter. Each tube contains 25,000 units of penicillin. The nozzle is sterilised at the time of packing and is covered with a screw-on cap which ensures that it will remain in a sterile condition right up to the time it is required for use.

Treatment consists of three injections, each of 25,000 units, repeated at intervals of 24 hours for three days, which, according to convenience, may be given either after the morning or afternoon milking. The quarter should be completely stripped out immediately prior to treatment and the end of the teat should be cleansed by swabbing with methylated spirits before the nozzle is inserted into the teat duct. All of the contents of the tube should be squeezed into the quarter and this should be followed by massage in an upward direction to ensure that the suspension is thoroughly dispersed. The dose injected is left in the quarter until the next milking and while the cow is under treatment the normal milking routine should not be disturbed. Penicillin is non-irritant and does not cause any damage to the udder tissues. Should the response not be satisfactory, a further course of three injections may be given but it must be recognised that staphylococcal mastitis does not respond to treatment with penicillin. Staphylococcal mastitis cannot be differentiated clinically from other forms of the disease, but in cases where doubt exists milk samples may be submitted for laboratory examination, which will enable a definite diagnosis to be established.

Vaccines have frequently been advocated for the treatment and control of mastitis but it is necessary, in the interests of the dairy farmer, to point out that no vaccine has yet been discovered that will either cure or prevent the disease.

In conclusion it must be emphasised that no matter what promise treatment may offer it must be regarded as a supplementary measure and as a second line of defence. Prevention must remain the primary consideration, and unless precautions are taken to prevent infection by the use of hypochlorite solution in the strength required for the disinfection of hands, teat cups and udders, by the provision of adequate facilities for the sterilisation of dairy utensils, by the maintenance of cow sheds, floors and fittings in a thoroughly clean and hygienic condition and by the adoption of rapid and efficient milking, it will not be possible, even with the aid of penicillin, to control the disease. Prevention is better than cure.

THE INFLUENCE OF ROTATION ON THE YIELD AND FLOUR STRENGTH OF WHEAT.

By F. L. Shier and W. P. Cullinane.

INTRODUCTION.

CROP rotation experiments have been conducted at the Chapman and Wongan Hills Research Stations since 1929 to obtain data primarily on the effect of rotation on the yield of wheat for grain. The general objectives were to demonstrate the beneficial effect of longer rotations and the inclusion of legumes. In each instance the legume employed was the Western Australian blue lupin (*Lupinus Varius*) although the present tendency in both regions is to use subterranean clover as the renovating pasture species. Although rotation experiments are difficult to conduct and are long term investigations, it was apparent by the early forties that the inclusion of the legume had appreciably improved crop yields. Owing to the ability of these plants to fix atmospheric nitrogen it seemed reasonable to assume that this improvement in yield was due primarily to a build-up in soil nitrogen. This view was supported by data from experiments at these two stations (Teakle and Samuel 1936) in which nitrogenous fertilisers were applied to the wheat crop in addition to superphosphate.

It has long been accepted that environmental conditions can markedly influence the protein (gluten) content of the grain. Of the soil factors at these research stations the nitrogen status is likely to be the most influential in raising the protein level of the grain. The value of wheat for bread making is dependant on the quantity of protein present and on its quality, the latter being largely a varietal characteristic. As normally the wheat grown on the light soils represented by the experimental areas was noted for its indifferent quality for bread making it was decided in 1944 to examine the grain from the several rotations for flour strength. The results of the tests on the 1944 samples were reported by Samuel (1945).

Yield data for the period 1933-1947, together with flour strength determinations for 1944-1947 are presented in this paper.

EXPERIMENTAL.

The rotations at each station comprised:—

(a) Continuous wheat;
(b) fallow, wheat;
(c) stubble, fallow, wheat;
(d) lupins, lupins, fallow, wheat.

The layout was duplicated and was such that two plots of each rotation were sown to wheat each year. The Chapman Research Station is situated 28 miles north of Geraldton near the northern limit of the wheatbelt. The soil on the experimental area was originally timbered with Jam (*Acacia Acuminata*) and is a brown to red brown sandy loam at the surface with rather more clay in the subsoil. The Wongan Hills Research Station is situated approximately 120 miles north-east of Perth. The rotation experiment is located on Wongan sandy loam, a soil type typical of large proportions of the laterite sand plains of Western Australia.

In this experiment 60lbs. of seed per acre was used at Chapman and 45lbs. per acre at Wongan Hills. Superphosphate has been the only fertiliser used and

was applied with each wheat crop. The variety planted varied from year to year and is shown in Appendix 1. In 1947 relatively strong flour varieties (Eureka at Chapman and Charter at Wongan Hills) were used to obtain a greater range of flour strengths under the effects of the various treatments.

Flour quality determinations were made in the Cereal Research Laboratory and the strength factors reported are—(1) Wholemeal fermentation time or Pelshenke time; (2) Farinograph (water absorption and strength figure); and (3) dry gluten, as described by Samuel (loc. cit.).

1. Wholemeal fermentation time or Pelshenke time. The longer the time in minutes the stronger the wheat.

2. Farinograph—

(a) Water absorption calculated on the basis of 13.5 per cent. moisture in the flour. The water absorption of a flour is not a good measure of strength but is commercially important because the higher the water absorption the greater the amount of bread produced per sack of flour.

(b) The Farinograph strength figure, the time in minutes from the commencement of mixing until the top of the graph falls below the level of the mid-point of the graph at maximum consistency. The greater the strength figure, the stronger the flour.

3. Dry gluten percentage—Since the amount of wet gluten is normally about three times the amount of dry gluten, only dry gluten contents are reported. The strength of a flour depends on both the quantity and quality of the gluten. All gluten determinations were by hand washing with tap water.

The monthly rainfall figures for the two stations for the period 1944-47 together with the averages since recordings were first commenced are shown in

TABLE I.
RAINFALL (Points).

	Jan.	Feb.	Mar.	Apl.	Growing Period: May	June	July	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total.
CHAPMAN RESEARCH STATION.														
1944	....	....	....	36	52	250	226	542	203	46	....	1,267	29	42	1,426
1945	....	....	29	25	15	283	939	233	381	149	19	2,004	33	27	2,133
1946	4	24	16	102	160	597	852	229	27	3	1,868	193	12	2,219
1947	....	45	62	143	323	338	321	134	156	365	1,637	19	3	1,909
Average (42 years)	24	37	67	75	236	429	393	264	145	90	1,556	38	26	1,827
WONGAN HILLS RESEARCH STATION.														
1944	3	....	21	19	249	131	374	193	40	14	1,001	7	40	1,091
1945	....	41	69	71	165	629	214	416	124	14	1,562	48	30	1,821
1946	....	33	31	201	244	444	447	197	18	2	1,352	106	....	1,713
1947	46	9	44	91	273	324	224	81	77	212	1,191	41	4	1,426
Average (22 years)	35	46	94	92	195	274	260	200	90	72	1,091	43	4	1,445

RESULTS.

A. Yields.—The average yield (two plots) for each year of the experiment (1933-1947) is shown in detail in Appendix 1. The average for the period 1936-47 and for 1944-47 when flour quality determinations were carried out are given in Table 2.

B. Wheat and Flour Quality.—The detailed figures for water absorption, strength, figure, dry gluten and Pelshenke time are set out in Appendix 2 for the four years (1944-47) whilst the averages for this period are shown in Table 2.

TABLE II.

FLOUR AND WHEAT QUALITY (1944–47) AND GRAIN YIELDS (1936–47 AND 1944–47)—AVERAGE FIGURES.

Rotation.	Flour.			Wheat.		
	Farinograph.		Dry Gluten % *	Pelshenke Time (mins.)	Yield (bus. per acre).	
	Water Absorption %	Strength Figure.			1936–47.	1944–47.
CHAPMAN.						
Continuous wheat	57·4	5·6	8·4	64	7·0	4·3
Fallow, wheat	55·6	3·8	6·9	54	9·1	7·0
Stubble, fallow, wheat	54·7	3·3	6·4	43	10·9	9·0
Two years lupins, fallow, wheat	57·9	5·6	8·9	58	18·3	15·6
WONGAN HILLS.						
Continuous wheat	55·4	5·3	6·9	55	6·6	4·7
Fallow, wheat	56·2	6·1	7·4	66	13·2	14·3
Stubble, fallow, wheat	57·1	6·8	7·5	66	16·5	18·3
Two years lupins, fallow, wheat	58·9	8·8	8·2	69	18·4	19·3

* Dry gluten percentage for the year 1946 is excluded from the Average, *see* Appendix 2.

CHAPMAN.

At Chapman it will be noted that the yield increased as the rotation lengthened. The fallow-wheat rotation gave an increase of 2.1 bushels (30 per cent.) over the continuous wheat plots, whilst the inclusion of the stubble year improved the yield by a further 1.8 bushels per acre, i.e., 56 per cent. over the continuous wheat. However, the inclusion of two years of legume in the rotation has given almost a three-fold increase over the continuous wheat rotation. Over the four years (1944-47) the increased yield of the legume rotation over that of the fallow wheat rotation has amounted to 73, 130, 125 and 170 per cent. respectively, whilst the corresponding increases over the yields of the stubble, fallow, wheat plots were 50, 68, 139 and 49 per cent. The variability in the response of the wheat crop to these rotations can be attributed largely to seasonal variations in the amount of soil nitrogen actually available to the growing crop caused by seasonal variations in the growth of the legume and the intensity of the winter rains. In the case of all treatments except the continuous wheat the cereal was preceded by fallow which would result in much of the soil nitrogen being converted to a readily soluble form very subject to leaching following intense winter rains. There may also be some variation in the response of the different varieties to varying levels of available soil nitrogen.

The legume rotation has quite definitely increased the flour strength over that from the wheat-fallow, and stubble-fallow-wheat rotations. The average figures show an increase in the percentage of protein (dry gluten) in the flour from the legume rotation compared with that from the fallow-wheat and stubble-fallow-wheat. These increases are probably not as consistent as those mentioned previously on yield and also are of lower magnitude but they are none the less

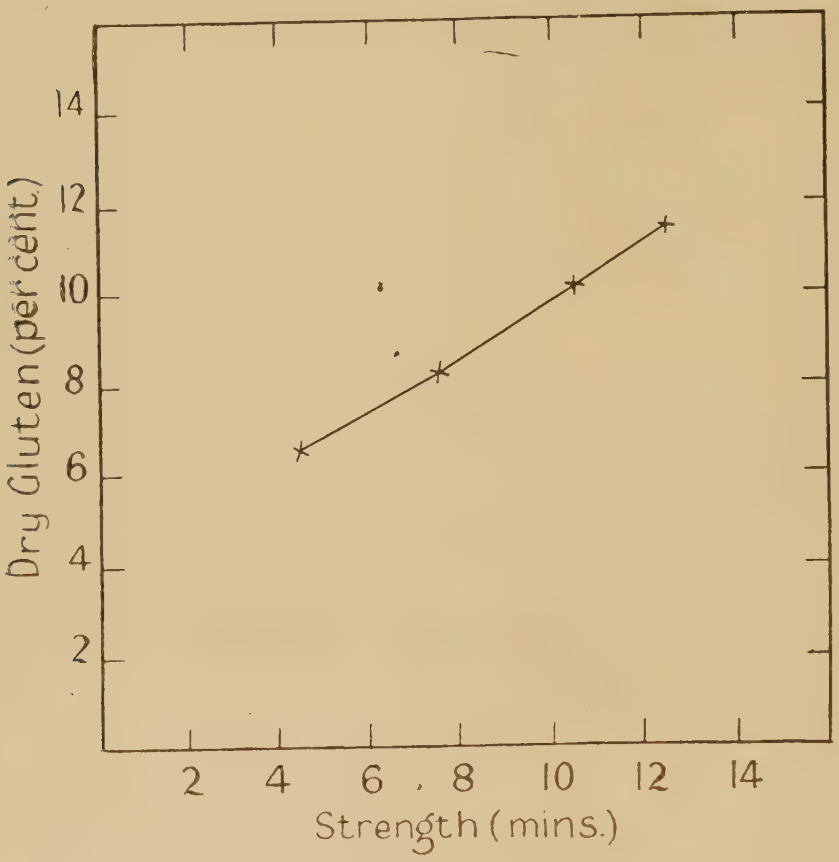


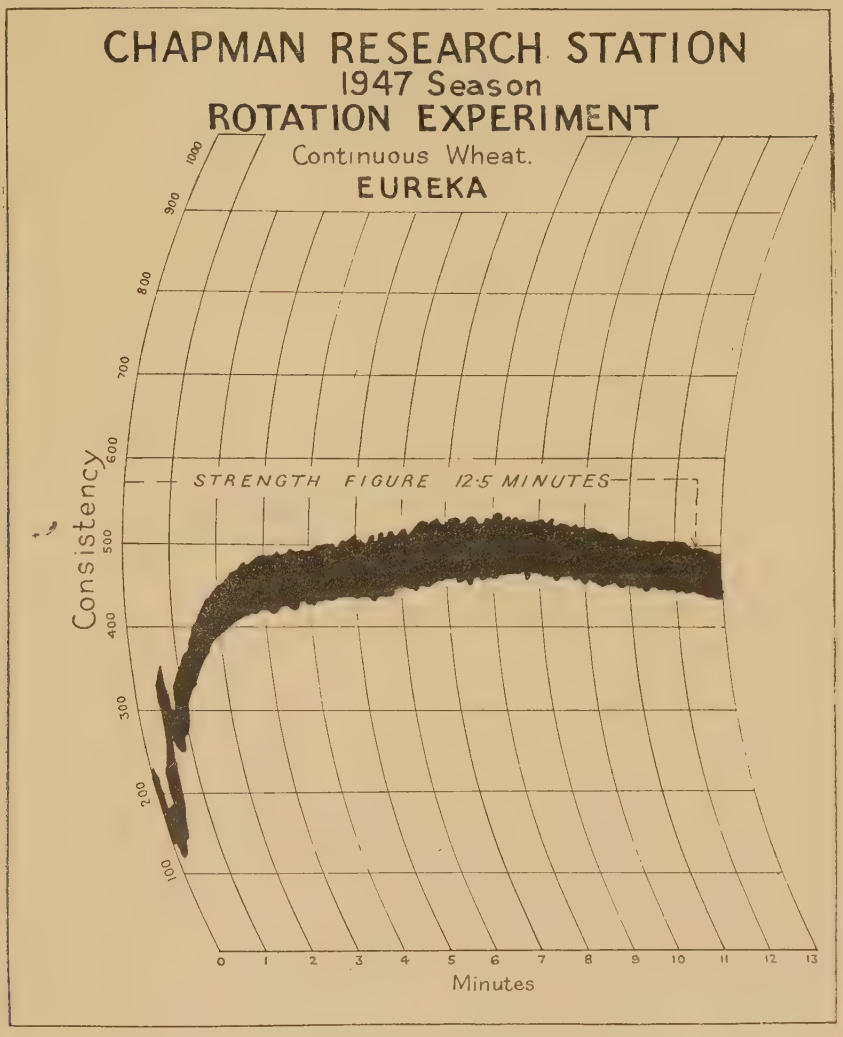
Fig. 1.—Illustrates the relationship between strength and dry gluten (with the same variety).

significant. The increments in gluten content are of economic importance because of their effect on flour strength. This point is perhaps best illustrated by the results from Chapman for 1947 when the variety Eureka was used, a variety which has the inherent capacity to produce a strong flour under suitable conditions. This is illustrated graphically in Fig. 1, whilst the farinograms on which this illustration is based are also included. When the dry gluten per cent. was only 6.6 the strength figure was 4.5, i.e., about equivalent to that for F.A.Q. wheat, but with each increase in gluten the strength figure rose also. When the dry gluten reached 11.4 per cent. the strength figure was 12.5 that is of "premium" strength.

The average results for Farinograph strength figure, water absorption and Pelshenke time demonstrate similar trends in favour of the legume rotation compared with the fallow-wheat and stubble-fallow-wheat rotations.

The continuous wheat plots at Chapman have given which at first sight may appear somewhat anomalous results on wheat yield and flour quality, namely, a low grain yield but high dry gluten, strength and Pelshenke figures, equivalent to those from the legume rotation plots. This result may be explained on the assumption that there was sufficient nitrogen available for protein formation for the very low yielding crop. Another possible explanation is that under

the peculiar conditions of these experiments at Chapman the continuous wheat plots have become infested with weed growth including in some years an appreciable percentage of medics and small clovers.



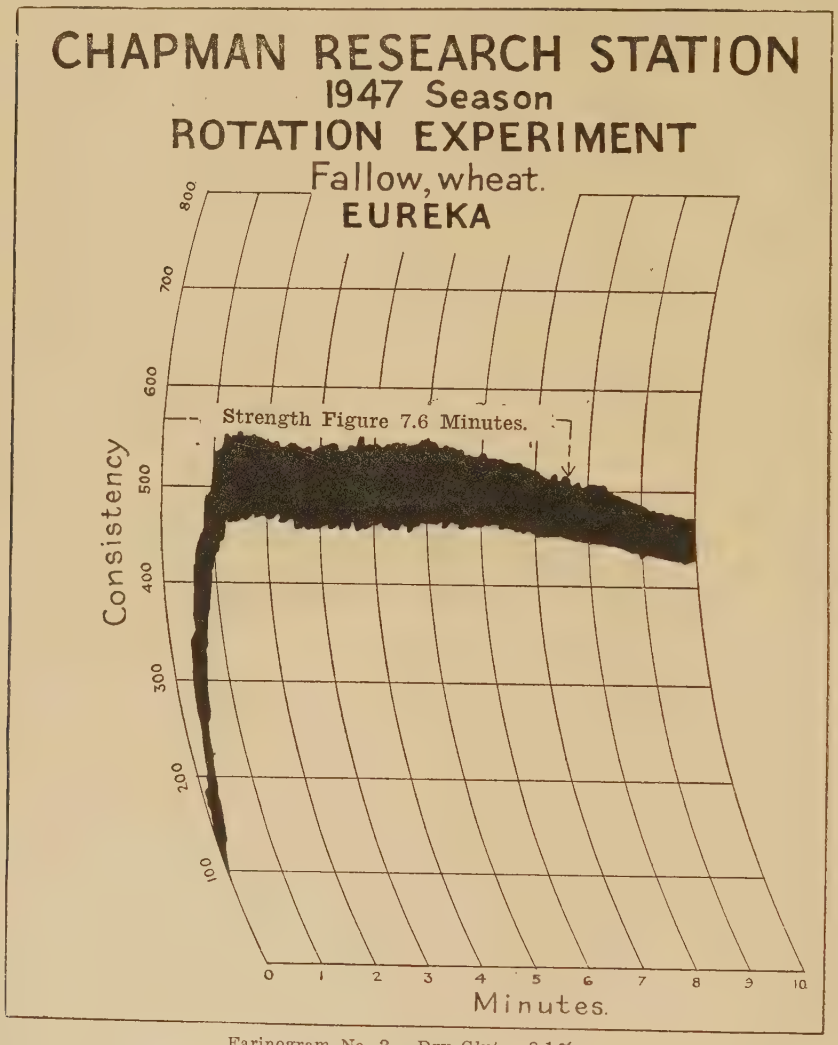
Farinogram No. 1.—Dry Gluten 11.4%.

WONGAN HILLS.

The results from this station differ from those at Chapman in two important respects. Firstly, although the average wheat yields for the treatments show the same general trends as at Chapman, in some years, e.g., 1944 and 1947 the wheat plots of the legume rotation were badly affected by Take-all with consequent markedly reduced yields.

Secondly the continuous wheat rotation consistently gave grain of the lowest protein (dry gluten) content and strength of the four rotations. In contrast to Chapman, medics and other legumes were entirely absent from the

weed growth on the continuous wheat plots. However, the introduction of the legume in the rotation has fairly consistently given marked increases in flour strength due to the increased protein (dry gluten) content.

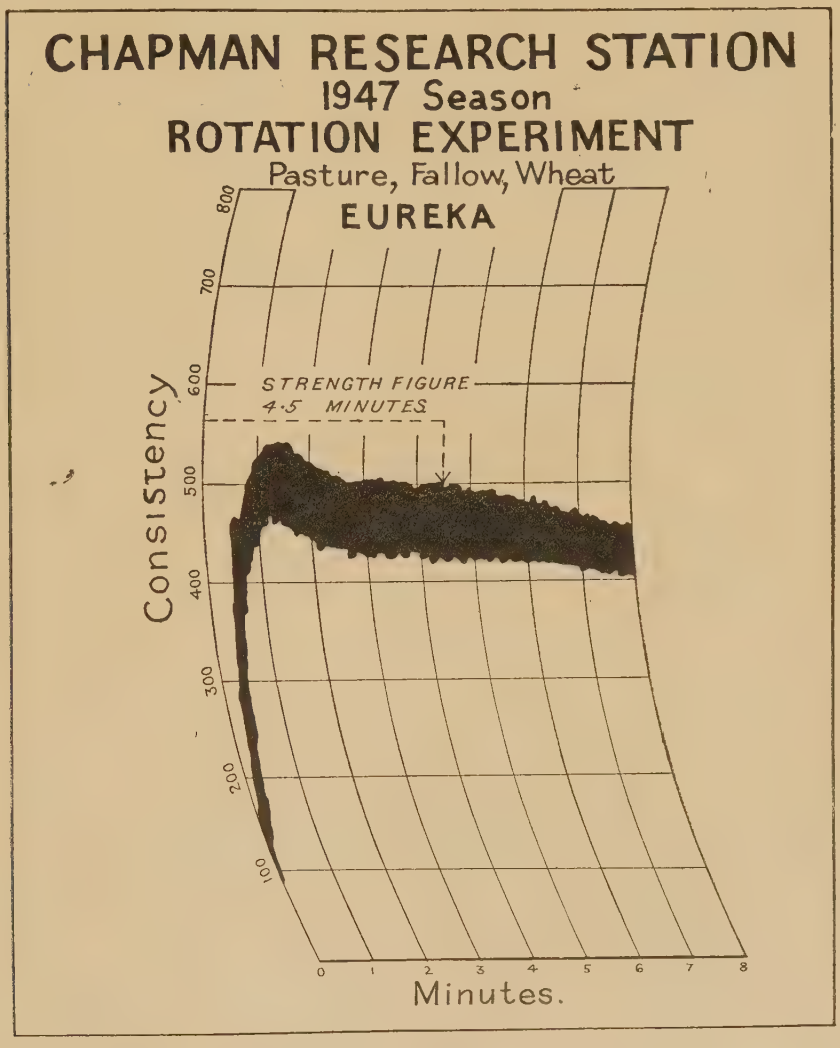


Farinogram No. 2.—Dry Gluten 8.1%.

DISCUSSION.

The wheat farmer is primarily interested in his yields per acre. In recent years there has been increasing evidence of declining wheat yields on the light soils as typified by the experimental areas under review at Chapman and Wongan Hills. The results presented support the contention that these decreasing yields are mainly due to a fairly rapid depletion of available nitrogen in soils which were only poorly supplied in this element initially. The nitrogen status of these soils must be improved before economic wheat yields can be obtained over a period of years. Artificial fertilisers such as sulphate ammonia are too costly and are thus uneconomic for this purpose. The only logical way of improving

these low grade soils and ensuring satisfactory yields is by the incorporation of legumes in the rotation. Such a practice not only ensures more and better grazing for stock but must tend to improve soil fertility with consequent improved grain yields of better quality wheat.

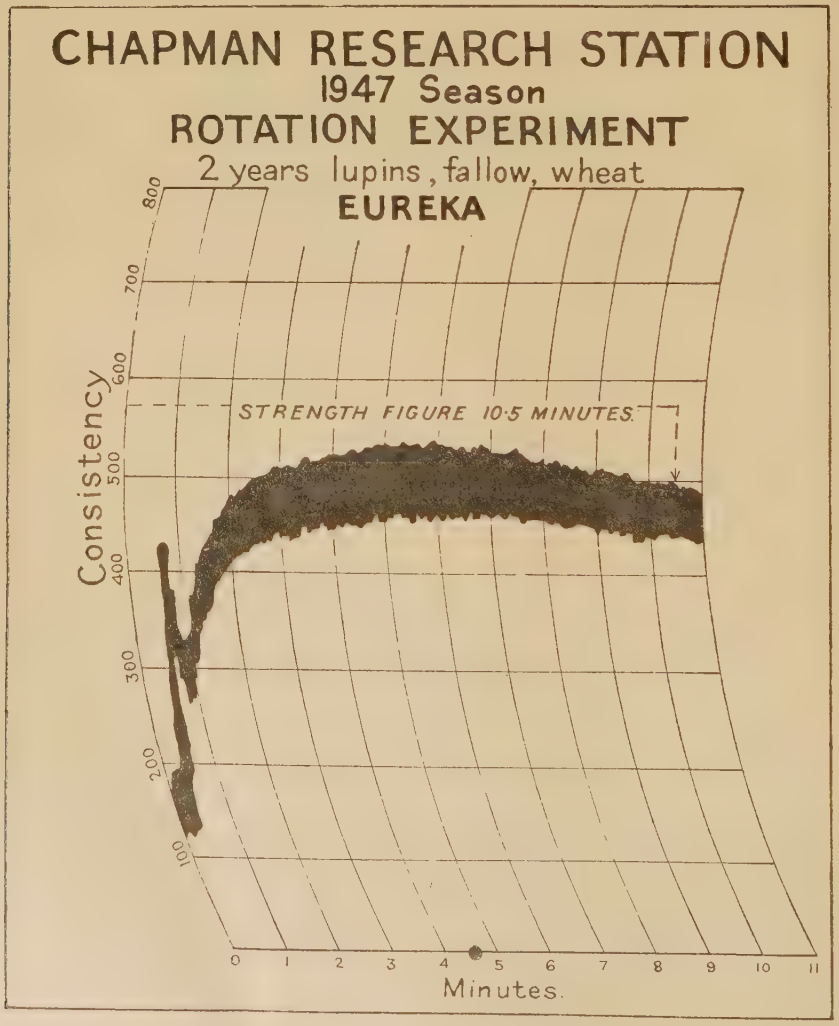


Farinogram No. 3.—Dry Gluten 6.6%.

In this regard numerous instances have been observed of the improved and excellent yields on "ploughed in" clover and lupin land. Typical of these are the results reported by Giles (1948) at Wongamine, near Northam. One area was cropped under the ordinary three course rotation, volunteer pasture-fallow-wheat, whilst the other area of similar soil had been sown on "ploughed in" (non-fallow) land following 11 years of sub clover pasture. Samples of the wheat from the two areas were tested for strength and these results together with the yield figures are set out in the table on the following page.

Rotation.	Yield (Bus. per acre).	Farinograph.		Dry Gluten %	Pelshenke Time (mins.)
		Water Absorption	Strength Figure.		
Three Course	12	58·5	3·0	6·0	37
After 11 years clover	27	61·5	5·1	9·0	42

The farmer's more immediate concern regarding his cropping rotation and choice of variety is the yield in bushels per acre but the strength of the resultant wheat has a much wider implication. Frequently criticism has been levelled at the quality of West Australian and Australian wheat for bread making and the cry has been for better varieties. It is suggested that much of the poor quality wheat for bread making may be more the result of low nitrogen status of the soil on which it is grown rather than the variety and conversely the general level of



Farinogram No. 4.—Dry Gluten 10.1%.

the strength of the f.a.q. can be raised by the improvement in soil nitrogen levels following the incorporation of legumes in the rotation. The data presented also clearly indicate that varieties which are capable of producing flour of satisfactory baking quality are unlikely to do so on light and exhausted or run down soils. For a number of years now the wheat breeding policy of the Department of Agriculture has been to produce varieties capable of giving a flour of filler strength, a standard described by Kent-Jones as "one which is of such strength that in a normal baker's grist it requires no help from strong wheats but is not able to carry any weak wheat."

Varieties capable of giving better quality protein may be developed by the plant breeder but for flour of satisfactory strength for bread making it is necessary that protein be present in sufficient quantity to satisfy the requirements of this standard.

The capacity of certain of the recently released varieties such as Charter, Kondut and Wongoondy to produce flour of satisfactory strength on the lighter soils of the wheat belt would appear from the data presented in this paper to be dependent on the crop following some years of a legume pasture such as lupins or subterranean clover. Under such conditions of high soil fertility not only will the yields be satisfactory but the wheat from these improved soils will tend to raise the strength of our f.a.q. It is hoped that in time further varieties will be produced which will have the capacity to give better quality bread making flour than those at present under cultivation whilst at the same time losing nothing in yielding ability or other agronomic characteristics. It is concluded however, that any marked improvement in the strength of this State's f.a.q. wheat is probably more dependent on the development of leguminous based rotations, particularly on the light and medium soils.

SUMMARY.

Experiments conducted at the Chapman and Wongan Hills Research Stations during the period 1933-47 *designed primarily to demonstrate the effect of longer rotations and the incorporation of legumes on the yield of wheat are described.*

Flour strength determinations on the grain from the several rotations over the four year period 1944-47 *are also presented.*

The results show that whilst the two-year rotation (fallow, wheat) and the three-year (stubble, fallow, wheat) have improved the yields somewhat, the inclusion of a two-year leguminous pasture period has frequently given two or three-fold increases over that obtained from continuous cropping.

The "strength" of the wheat was quite definitely improved through the use of the legume. When relatively strong flour varieties were used the grain from some of the non legume rotations was little better than f.a.q. strength whereas that from the legume rotation was approaching "premium" quality.

It is suggested that these increases in yield and flour strength are largely the result of an improvement of the nitrogen status of the soil following the legume pasture.

The significance of the results are discussed and it is concluded that firstly the development of leguminous based rotations particularly for the light and medium soils of the wheatbelt is essential for the maintenance of a sound agriculture and secondly such rotations are more likely to improve the strength of the State's f.a.q. wheat than improved varieties.

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Samuel, L. W. (1945): Jn. Dept. Agric.
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APPENDIX 1.

Rotation Experiment 1933-1947. Yield in bushels per acre.

CHAPMAN

Rotation	Variety.	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
		Bencubbin	Bencubbin	Nabawa	Nabawa	Nabawa	Nabawa	Nabawa	Nabawa	Nabawa	Bungulla	Bungulla	Nabawa	Nabawa	Bungulla	Eureka
Continuous-Wheat		16·3	Crop	3·6	13·8	7·7	6·2	13·8	6·1	6·4	4·3	8·5	5·3	2·9	4·5	4·6
Fallow-Wheat		22·8	badly	19·0	11·6	14·9	11·8	10·9	9·9	10·5	5·7	5·5	6·7	5·5	8·5	7·1
Stubble—Fallow-Wheat		20·4	affected	22·2	13·8	17·2	14·4	11·7	13·3	8·3	6·9	9·8	7·7	7·5	8·0	12·8
Two years Lupins—Fallow-Wheat		18·8	by rust	24·2	20·2	31·7	19·9	16·9	15·3	8·7	14·1	30·9	11·6	12·6	19·1	19·1

WONGAN HILLS

	Totadgin	Totadgin	Totadgin	Totadgin	Totadgin	Totadgin	Totadgin	Totadgin	Merredin	Merredin	Merredin	Merredin	Koorda	Koorda	Charter
Continuous Wheat	21·7	5·8	13·4	7·9	Crop	13·5	6·9	9·6	12·7	2·2	7·1	5·1	2·1	3·9	7·8
Fallow-Wheat	21·6	14·6	17·2	15·6	des-	13·1	5·9	13·0	16·5	14·7	22·5	16·2	14·1	9·5	17·2
Stubble—Fallow-Wheat	21·8	15·1	21·1	17·1	troyed	17·1	10·9	13·1	16·3	24·2	25·5	22·1	17·6	14·0	19·6
Two years Lupins—Fallow-Wheat	21·7	13·1	20·9	19·2	by hail	16·4	9·3	12·8	26·3	25·6	34·7	12·7*	29·1	19·3	16·3*

* Affected by Take-all.

APPENDIX 2.

Wheat Strength (average of two samples), Rotation Experiment, 1944-1947.

CHAPMAN

Rotation.	FLOUR (Milled experimentally on a Brabender stone mill)												WHEAT.			
	Farinograph															
	Water Absorption.				Strength Figure				Dry Gluten per cent.				Pelshenke time (minutes).			
	1944	1945	1946	1947	1944	1945	1946	1947	1944	1945	1946	1947	1944	1945	1946	1947
Continuous Wheat	54·8	56·8	53·4	64·7	3·8	2·8	3·1	12·5	7·4	6·4	6·0	11·4	32	43	52	130
Fallow-Wheat	54·8	55·8	51·8	59·9	3·6	2·0	1·8	7·6	7·2	5·4	(*a*)	8·1	32	38	48	60
Stubble—Fallow-Wheat	54·5	54·8	50·6	59·0	4·0	2·5	2·0	4·5	7·0	5·6	(*a*)	6·6	32	37	48	53
Two years Lupins-Fallow-Wheat	58·0	56·9	52·1	64·7	6·4	2·8	2·8	10·5	10·1	6·4	6·1(*b*)	10·1	41	40	59	93

(*a*) No gluten obtainable; dispersed during washing. (*b*) Gluten obtainable from only one sample.

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Continuous Wheat	52·2	55·4	52·9	61·1	2·0	3·4	6·7	9·0	5·4	7·1	7·1	8·1	34	46	63	78
Fallow-Wheat	53·8	55·6	53·1	62·3	3·6	4·1	6·4	10·2	6·3	7·3	7·2	9·0	42	45	64	114
Stubble—Fallow-Wheat	55·7	55·4	53·3	63·8	5·3	4·2	6·8	10·9	7·0	7·1	7·4	8·5	47	44	66	109
Two years Lupins-Fallow-Wheat	56·2	56·8	53·4	69·0	5·6	4·6	8·1	16·7	8·2	7·6	7·6	9·5	50	42	74	102

PHOSPHORUS SUPPLEMENTS FOR DAIRY COWS.

L. C. Snook, Animal Nutrition Officer.

TO ensure continued high milk production and good health it is essential that dairy cows should receive adequate supplies of phosphorus in their food. For many months of the year typical West Australian pastures do not contain sufficient of this essential phosphorus. If the farmer fails to provide the correct form of mineral supplement the cows cease to produce milk to full capacity, or they deplete their bodily reserves. In either case the farmer suffers financial loss.

Before the war the need by the dairy cow for additional phosphorus received continual emphasis, and the provision of phosphatic licks was accepted as part of good farming practice. But during 1940-46 the feeding of bonemeal and di-calcic phosphate went right out of fashion, firstly because these materials could not be purchased, and subsequently because there was no obvious evidence that the cows suffered when these licks were withdrawn. Farmers are also topdressing their pastures with increasingly heavy annual applications of superphosphate, and it is not surprising that the resultant high quality mixed pastures should be expected to contain all the phosphorus needed by dairy cows. Such is not the case, however.

Recent studies have shown very clearly that many cows in our South-Western dairying districts are suffering from a real or incipient phosphorus deficiency. This must certainly affect milk production, and may also reduce resistance to disease and be one explanation of seasonal sterility. It seems that good milking cows while on winter pastures cannot make good the losses in phosphate suffered during the summer, when dry feed relatively deficient in phosphorus forms the bulk of the diet. It is well known, of course, that, as pasture plants mature, the phosphorus content falls, but very few realise just how serious this fall can be to the milking cow. Even good quality meadow hay cut from excellent South-West mixed pastures does not contain enough phosphorus. The present indications are that not only should dairy stock *of all types* receive phosphatic supplements during the summer months but that supplements should be fed to milking cows during the winter as well, as it is during this time that lactation imposes the maximum drain on the mineral reserves.

RECOMMENDED PHOSPHATIC SUPPLEMENTS.

Sterilised Bonemeal.—On general principles this seems the best supplement to feed. Bonemeal supplies not only phosphate but all the other ingredients which have been used to build up healthy bone.

Unfortunately supplies of bonemeal are limited and other sources of phosphate have to be exploited.

Steamed bone flour.—This is a by-product of gelatine manufacture and is a cheap, convenient source of phosphorus. Being an odourless powder, it is easily mixed with other materials without affecting the palatability.

Di-calcic phosphate.—This is prepared from phosphatic rock and sold in powdered form as a source of readily available phosphorous. In most cases the dairy farmer would be advised to buy the "concentrate," rather than the "lick" which is already mixed with salt, as the former is cheaper per unit of phosphorus.

It should be remembered that Denmark Lick or Denmark Substitute Lick does NOT supply phosphate. These licks are prepared to supply cobalt and copper.

METHOD OF SUPPLYING PHOSPHATE.

In the bails.—Where cows are bail fed it is a simple matter to mix the phosphatic supplement with the other food. One can then be certain that every cow receives the measured amount. On most farms two ounces of bonemeal or di-calcic concentrate per head per day should meet all requirements but high-producing cows may benefit from as much as four ounces per day. During the summer months, if no green picking is available, it is wise to err on the generous side.

Complaints will be made that cows will not eat bonemeal, or even enter the bails when this admittedly obvious supplement is mixed with the usual food. It is important to let the cows become accustomed to the smell of bonemeal before using any quantity. Place a mixture of salt and bonemeal (and even bran) in boxes in the yards, or near the watering places, until the cows have commenced to eat the new supplement. Bonemeal can then be gradually mixed with the food in the bails. Despite statements to the contrary, no difficulty should be experienced in getting cows to consume bonemeal so long as commonsense precautions are taken.

Steamed bone flour and di-calcic phosphate have little smell or taste and should present no difficulty in feeding.

In the field.—Phosphatic supplements in the form of salt "licks" should be available *to all dairy stock* in the field. These licks are prepared by mixing phosphate with coarse salt and placing the mixture in boxes which should be set up under some sort of shelter to keep out the rain.

A suitable salt lick can be made up as follows:—

Coarse salt	2 parts
Bonemeal or di-calcic concentrate	1 part

In areas where copper and/or cobalt deficiency is at all likely, Denmark lick should be supplied as before, or the additional mineral supplements can be incorporated in the phosphate mixture as follows:—

To each 100 lb. of salt add:—

Powdered bluestone or copper sulphate	4 oz.
Cobalt sulphate	1 oz.

In mixing bluestone or cobalt sulphate with the salt it may be more convenient to dissolve this in hot water and sprinkle over the salt before mixing. Care should always be taken to use a glass or china vessel when dissolving bluestone in water, as this solution rapidly corrodes metal containers.

Licks of the above type will keep indefinitely while dry so they can be prepared in bulk lots. The use of mineral di-calcic phosphate may be an advantage in this regard, as bonemeal will not keep so well if it becomes damp.

DAIRY HERD IMPROVEMENT SCHEME.

GRADE HERD RECORDING, 1947-48.

M. Cullity, Superintendent of Dairying.

AS stated in the report on Grade Herd Recording for the season 1946-47 (this Journal December, 1947), the testing of commercial herds ceased in 1942 owing to the need for men for the Defence Forces and urgent public works.

The scheme was recommenced in 1946 with 21 units.

Experiences during the year showed that the keenness of farmers was sustained and with the opening of the season in 1947 three additional units were commenced.

Seasonal conditions were favourable, with the result that abundance of pasture feed was available, consequently stock remained in excellent condition throughout the year and the yield per cow showed a substantial rise. Although some improvement in yield might reasonably be expected from the data provided by the scheme, it would be too optimistic to expect that the actual rise from 181 to 213 lb. of butterfat per cow was solely responsible to this. There is no doubt that the better seasonal conditions providing a greater abundance of feed was the prime cause. There is evidence however that many factors of management, including designed efforts on the part of the farmer to improve feeding, contributed to the rise.

In this report, in addition to setting out details regarding the performance of the various herds and units, some indication will be given of the factors which have contributed, and also an outline of various projects which have been, or will be, commenced shortly, in order to supply additional data to dairy farmers to assist them in the more profitable management of their herds.

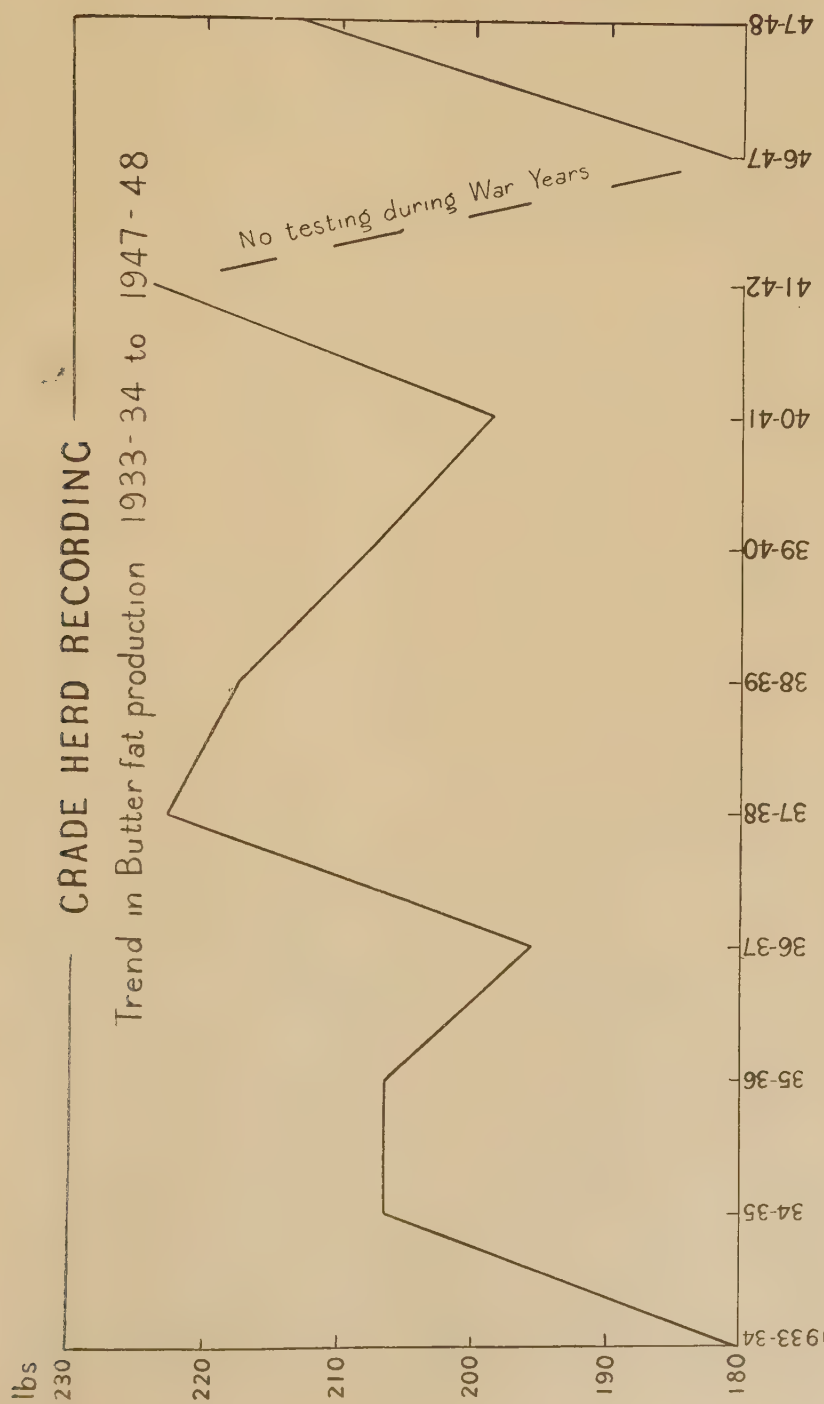
Graph No. 1 indicates the trend in average yields each year since the inauguration of the scheme in 1933-34, and while the upward movement of yields from year to year is not regular, a definite trend may be seen.

It is interesting that the yield in 1946-47, (the first post-war year of testing), approximated that of 1933-34 only. However, this performance is better than that in the earlier year owing to the fact that average cow production fell seriously during the war period.

The following table shows the degree to which this occurred.

Table 1.

Year.	Milk (gals.)	No. of Cows.	Average per cow.	
			Milk (gals.)	Butterfat. (lb.)
1938–39	45,562,000	119,814	380·2	152·1
1939–40	44,745,000	121,852	367·2	146·8
1940–41	44,801,000	124,370	360·2	144·1
1941–42	49,050,000	128,664	381·2	152·5
1942–43	46,346,000	129,763	357·1	142·8
1943–44	43,156,000	138,100	312·5	125·0
1944–45	40,416,000	136,499	296·2	118·5
1945–46	43,004,000	133,502	322·1	128·8
1946–47	45,596,000	131,711	346·2	138·5
1947–48	51,239,000	132,305	387·3	154·9



Graph No. 1.—Trend in average yields each year since the inauguration of the scheme in 1933-34.

There is no doubt that the major cause of the decline in the average yield per cow during the war years was the reduction in the quantity of feed available for each cow as the result of the reduced application of superphosphate to pastures. The depressing effect of this was gradual during the operation of the rationing scheme, but the useful effect of the applications of superphosphate was very quickly demonstrated when adequate supplies again became available.

Other factors, such as the shortage of labour, materials, purchased fodders, also contributed but probably to a minor extent. In this period also, farmers did not have the convenience of having their herds tested and so were not able to cull on the basis of actual knowledge of performance.

The average yields for each year since the commencement of the scheme are shown in table 2.

Table 2.

AVERAGE PRODUCTION PER COW 1934–48.

Year.	No. of Cows.	Milk (gals.)	Test (per cent.)	Butterfat (lb.)
1933–34	4,308	415	4·35	180·60
1937–38	10,033	486	4·59	223·10
1938–39	12,368	487	4·48	218·70
1939–40	11,479	462	4·51	208·30
1940–41	9,609	447	4·45	199·00
1941–42	7,081	496	4·52	224·02
	*5,695	502	4·61	231·78
1946–47	11,944	420	4·36	181·00
1947–48	12,395	478	4·46	213·30

* Excludes four units tested for from six to seven months only.

Heifers intended for the soldier settlement scheme, SIDCUP near Mt. Barker.

It will be noted from this that the total number of cows under test was higher than in any previous year.

In all 460 herds were tested.

The value of the scheme is acknowledged throughout the dairying districts and there were a large number of farmers who wished to have their herds included but it proved impossible to make satisfactory arrangements. It is likely that in the coming year further extension of the scheme will take place.

Details of the performance in each unit are shown in table 3, the units being arranged in order of merit.

TABLE 3.

PRODUCTION PER COW IN EACH UNIT.

(Units listed in order of Merit)

	Unit Letter	Unit.	Number of Herds.	Number of Cows.	Percentage of Heifers*	Milk Average lb.	Test	Butterfat Average lb.	
								1947–8	1946–7
							%		
1	C	Harvey ...	17	665	38	5,479	4·65	255·00	192·0
2	H	Sth Cowaramup	16	341	35	5,839	4·30	252·76	194·9
3	G	Nth. Cowaramup	24	535	34	5,154	4·74	244·20	228·0
4	B	Waroona ...	18	520	32	5,385	4·40	238·69	198·0
5	J	Rosa Brook	24	571	33	4,965	4·60	228·75	201·0
6	A	Pinjarra ...	17	569	33	5,163	4·40	227·27	184·0
7	S	Mt. Barker ...	21	589	14	5,084	4·39	223·81	158·5
8	T	Albany ...	19	435	34	4,879	4·53	220·70	166·0
9	L	Donnybrook	19	476	36	4,476	4·89	219·00	193·0
10	W	Denmark ...	19	365	30	4,858	4·45	216·35	191·6
11	M	Balingup ...	23	665	31	4,735	4·50	213·34	181·5
12	N	Bridgetown...	21	570	7	4,698	4·53	213·04	167·5
13	P	Pemberton ...	23	459	4	4,672	4·50	210·65	148·4
14	D	Brunswick ...	13	466	21	4,605	4·57	210·63	181·0
15	E	Ruabon ...	16	567	34	4,956	4·10	207·16	201·6
16	R	Wilga - Noggerup	21	499	43	4,526	4·50	205·16	162·0
17	Y	Scotsdale ...	17	377	52	4,351	4·62	201·43	...
18	U	Nannup ...	18	536	20	4,641	4·20	197·70	170·0
19	I	Margaret River	22	566	33	4,600	4·20	196·08	187·4
20	K	Forest Grove	18	438	5	4,300	4·60	195·50	163·3
21	O	Manjimup ...	23	593	13	4,445	4·34	193·30	167·8
22	F	Metricup ...	18	493	37	4,624	4·12	190·63	216·7
23	V	Vasse-Jindong	19	547	26	4,367	4·30	189·10	...
24	X	Northcliffe ...	19	553	19	4,161	4·26	177·00	...

* Including two and three year olds.

It will be seen that the leading unit was that at Harvey, where 17 herds with 665 cows gave an average yield of 5,479 lb. milk and 255 lb. of butterfat. Harvey is an irrigation area, where a number of the farmers have irrigated pastures. The performances in other districts in non-irrigable areas, such as Cowaramup North and South, with yields of 5,839 lb. milk, 252.17 lb. butterfat and 5,154 lb. milk, 244.2 lb. butterfat respectively, show that dairying can be adjusted to meet differences in conditions. Although the Harvey area may have

the advantage of irrigated pasture, several of the herds supply milk for the metropolitan trade and therefore calving occurs throughout the year. In the non-irrigable areas where milk is not sold for liquid consumption, calving can be arranged to allow the greater part of lactation to be in the winter and spring grazing periods.

A most pleasing feature of the Harvey average, however, is the improvement from that of the previous year when the yield was 4,446 lb. milk and 192.0 lb. butterfat. South Cowaramup also showed a substantial improvement from 4,792 lb milk, 194.9 lb. butterfat.

One difficulty, in interpreting from the unit figures the effectiveness of herd recording in increasing yields, is due to the failure of some farmers to maintain their herds under test continuously. It has been shown elsewhere that regularity in testing over a period of years does mean a considerable advantage by way of higher yields.

Reference was made in last year's report to the case of Mr. O. Foan of Donnybrook, who has had his herd under test each year since 1933. In his first year of testing his herd was twelfth in his unit, in the following year it was ninth, then third, and each year since 1936 it has been the leading herd. During 1946-47 24 cows averaged 334 lb. butterfat, while in 1947-48 the average for 20 cows was 380 lb.

In table 4 a comparison is shown of the herds grouped according to production for each year.

Table 4.

HERDS GROUPED ACCORDING TO PRODUCTION.

Butterfat per Head (lb.)

Year.	350–400	300–350	250–300	200–250	150–200	100–150	Under 100
	%	%	%	%	%	%	%
1933–34	...	1·3	3·9	20·3	53·6	18·3	2·6
1939–40	...	3·2	18·5	34·6	32·9	9·7	1·1
1940–41	...	1·5	13·9	31·8	39·4	12·7	·8
1941–42	1·6	8·2	21·9	42·1	21·5	4·7	...
1946–47	...	1·2	7·9	25·2	39·9	22·4	3·4
1947–48	·6	3·9	18·1	38·8	27·6	10·2	·8

In 1933-34, 74.5 per cent. of the herds produced less than 200 lb. butterfat; in 1936-37, 65.7 per cent.; while in the year under review the percentage fell to 38.6.

In 1933-34, 5.2 per cent. of the herds produced over 300 lb. butterfat; for 1946-47, 9.1 per cent. achieved this figure, and for 1947-48 the percentage rose to 22.6.

While these figures show that some improvement has been achieved, they also indicate that far too many herds are yet below 200 lb. butterfat, which figure might be taken as the minimum for a profitable herd. On the other hand,

while the 22.6 per cent. which were over 300 lb. is a substantial improvement on the previous year, it is clear that the great bulk of herds have ample margin for improvement.

In table 5, all cows are grouped according to their production of butterfat. The figures are shown separately for mature cows and for heifers.

TABLE 5.

COWS GROUPED ACCORDING TO AGE AND PRODUCTION

(Cows Tested less than 90 days excluded)

Groups according to Butterfat production (lb.)

Year.	Age.	Over 600	500–600	400–500	300–400	200–300	150–200	100–150	Under 100	Total Cows.
		%	%	%	%	%	%	%	%	
1942 ...	Mat.	0·02	0·3	2·4	21·8	46·4	17·4	8·7	3·0	4,287
1947 ...	,,	...	0·07	0·68	7·97	35·16	26·37	20·13	9·62	8,711
1948 ...	,,	0·01	0·1	1·85	14·84	42·11	21·21	13·67	6·21	8,999
1942 ...	Heifer	...	0·05	0·2	5·8	36·8	27·5	20·2	9·4	1,978
1947 ...	,,	...	...	0·1	3·2	25·5	29·4	25·8	16·0	3,232
1948 ...	,,	...	0·05	0·21	7·14	36·42	26·58	19·16	10·44	3,396

Here again it will be seen that while there has been a considerable improvement on last year, too large a number of cows are unprofitable producers and therefore should be culled.

Culling.

Previously the greatest emphasis in discussing herd-recording and the use of data was on the question of culling and breeding. The degree to which the farmer will use the data for the purpose of culling must remain largely a matter for his own initiative, although provision is in the rules that where a cow fails to produce 150 lb. butterfat in two succeeding lactations, she shall be culled.

In view of the probability that in the small herds of Western Australia, the least profitable output per cow is in the region of 200 lb. butterfat, consideration should be given to culling animals which do not reach this figure. As will be shown later, there is evidence that culling from herds is not as heavy as appears desirable. Reports from recorders, however, suggest that many farmers have refrained from selling any stock until the year's testing has been completed.

Month of Calving.

In the present scheme, while the importance of culling continues to be recognised, an effort has been made to bring into prominence the part that various aspects of management play in affecting yields. In this regard the data presented over the past several years regarding the influence of the month of

calving on production, is extremely valuable. This information has now been collected over nine years and is based on 59,718 lactations. Details are given in table 6, and graph No. 2.

Table 6.

PRODUCTION OF COWS ACCORDING TO MONTH OF CALVING.

Month.	1947–48		7 years 1936–42 and 2 years 1946–48.	
	No. of Lactations.	Average Butterfat.	No. of Lactations.	Average Butterfat.
		lb.		lb.
January	108	208·6	797	190·0
February	142	219·7	1,343	201·5
March	593	239·5	4,287	224·4
April	1,693	257·5	9,917	239·7
May	1,746	240·7	10,799	236·7
June	1,870	228·1	10,734	232·2
July	1,566	215·6	10,148	224·5
August	977	188·4	5,935	196·8
September	492	185·1	2,909	178·3
October	273	175·8	1,590	169·6
November	77	209·1	732	188·0
December	62	220·6	527	182·1
Totals	9,599	...	59,718	...

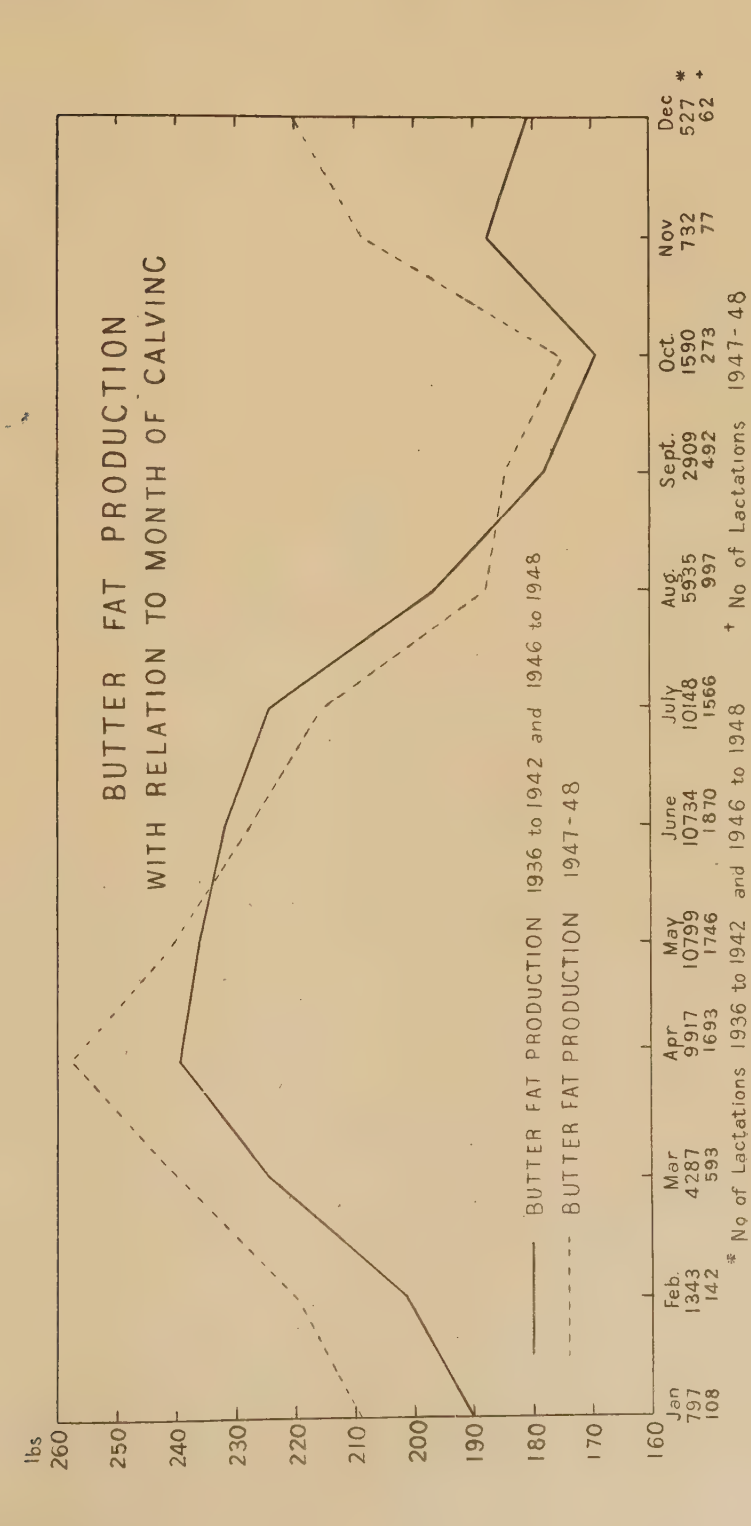
It is apparent from a perusal of this data that those cows which calve during the months March, April, May, June and July are most likely to show higher yields than those which calve in any other month. Some variation from the graph may be found in individual districts, but a study of these shows that the difference is not as great as might be expected. For general purposes the graph should be taken as an indication of the position for the whole of the State, other than in areas from which supplies of milk for the metropolitan area are drawn and in which farmers endeavour to maintain a high level of production during the summer months. This frequently is achieved by the use of purchased concentrates with or without the basis of irrigated pasture.

The number of cows which calved during the optimum period was 78 per cent. From experience during the past few years it appears to be very difficult for farmers to organise for a higher proportion of the cows to calve in this period and this is probably related to obstacles provided by disease in causing temporary or partial sterility.

In an endeavour to ensure that a greater number of cows calve at the right time, arrangements should be made to treat each cow after calving so that the genital passages will remain in a healthy condition. Adequate control of the bull is also desirable.

273-Day Average.

A study of table 7 in conjunction with the foregoing data regarding the influence of the month of calving is also of value. An endeavour is made to show that those cows which have remained in milk for a full 273-day period have produced far more than the average for the whole of the scheme.


BUTTER FAT PRODUCTION
WITH RELATION TO MONTH OF CALVING
lbs
260
250
240
230
220
210
200
190
180
170
160
BUTTER FAT PRODUCTION 1936 to 1942 and 1946 to 1948
BUTTER FAT PRODUCTION 1947-48
Jan 797 108
Feb. 1343 142
Mar 4287 593
Apr 9917 1693
May 10799 1746
June 10734 1870
July 10148 1566
Aug. 5935 997
Sept. 2909 492
Oct. 1590 273
Nov 732 77
Dec * 527 + 62
* No of Lactations 1936 to 1942 and 1946 to 1948
+ No of Lactations 1947-48

Graph No. 2.

Table 7.
COWS COMPLETING LACTATION.

	Unit.	Percentage of Cows Completing Lactation. *	Cows Completing 273 days		Unit Butterfat Average. (lb.)
			Percentage.	Butterfat Average. (lb.)	
C	Harvey	74	36	320·52	255·00
R	Wilga	89	10	309·07	205·16
A	Pinjarra	86	27	308·32	227·27
N	Bridgetown	...	12	302·46	213·04
H	Cowaramup, South	84	48	299·20	252·76
L	Donnybrook	88	22	296·66	219·00
G	Cowaramup, North	80	40	292·74	244·20
M	Balingup	95	23	289·80	213·34
S	Mt. Barker...	90	26	288·83	223·81
D	Brunswick	78	14	285·56	210·63
V	Vasse-Jindong	58	13	282·42	189·10
K	Forest Grove	38	12	277·17	195·50
J	Rosa Brook	74	32	274·30	228·75
T	Albany	72	38	271·13	220·70
I	Margaret River	50	32	270·05	196·08
W	Denmark	50	42	267·92	216·35
U	Nannup	86	14	266·17	197·70
B	Waroona	89	46	265·79	238·69
P	Pemberton	92	27	261·61	210·65
E	Ruabon	84	22	259·72	207·16
O	Manjimup	84	15	257·40	193·30
Y	Scotsdale	78	33	255·49	201·43
F	Metricup	57	27	248·28	190·63
X	Northcliffe	68	22	235·69	177·00
	Averages	76	26	279·62	213·3

* i.e., 273 days or drying off naturally in a lesser period.
Average Butterfat of Cows not completing full 273 days :—188·60.

It will be noted that the data is given for each unit and that figures are also given showing the percentage of cows completing lactation as distinct from those which have completed a full 273 days. In the former case the cows which complete 273 days and those which have dried off in a lesser period, are included

For the whole of the scheme 76 per cent. of the cows completed lactation but only 26 per cent. were in milk for 273 days. These averaged 279.6 lb. butterfat compared to the average for all units of 213.3 lb. This, however does not give a complete picture. When the 26 per cent. which completed their 273 days are separated from the 76 per cent. completing lactation—leaving the 50 per cent. which completed lactation in a lesser period than 273 days—it is found that the average for the latter is 188.6 lb. only. In other words, the cows that completed the full period produced an average of 91 lb. of butterfat higher than those which dried off in a lesser period. It is contended that calving in the optimum period mentioned earlier gives a greater prospect of keeping cows in milk over a long lactation period.

Herd Wastage.

As another means of assisting dairy farmers indirectly to achieve higher yields, data has been collected regarding the causes of herd wastage. The first attempt to do this was in a survey of dairying in the Brunswick unit in 1940. An effort was made to collect information during the last pre-war testing period 1941-42, but unfortunately the data was not complete. The information obtained during the past season is shown in table 8.

TABLE 8.

HERD WASTAGE.

Unit.	Unit Letter	No. of Cows in Unit.			Total Disposals Wastage, Etc.	Sold for Dairying Purposes.	A	B	C	D	E	F	G	H	I
								Disease.				Other Causes.			
		"A" Class.	"B" Class.	Total Cows.			Low Production.	Udder Troubles Mammitis, etc.	Abortion and Sterility.	T.B.	Other Diseases.	Accident or Injury.	Old Age.	Other Causes.	Sundry Deaths.
Pinjarra	A	593	46	639	74	4	53	5	...	...	3	3	...	6	...
Waroona	B	560	4	564	90	16	43	18	1	...	2	2	2	6	...
Harvey	C	692	...	692	44	1	36	2	...	...	...	...	1	2	2
Brunswick	D	475	1	476	29	4	12	1	3	...	...	...	8	...	1
Ruabon	E	583	6	589	60	31	26	...	...	...	1	1	...	...	1
Metricup	F	521	...	521	55	4	35	7	...	2	...	2	2	...	3
Nth. Cowaramup ...	G	544	65	609	58	6	39	9	...	2	...	...	...	...	2
Sth. Cowaramup ...	H	368	5	373	32	...	28	3	1	...	...	...	...	...	...
Margaret River ...	I	600	...	600	40	...	32	4	...	...	...	1	1	...	2
Rosa Brook ...	J	609	15	624	45	1	30	5	7	...	...	1	...	1	...
Donnybrook ...	L	504	10	514	44	16	24	...	...	...	1	1	...	...	2
Balingup	M	680	...	680	29	...	21	2	...	...	...	2	...	3	1
Bridgetown	N	578	...	578	29	1	12	12	...	...	1	...	2	1	...
Manjimup	O	609	...	609	26	...	19	4	...	...	...	...	2	1	...
Pemberton	P	461	...	461	12	...	5	...	3	...	...	1	...	3	...
Wilga	R	558	7	565	131	22	82	18	...	...	...	3	1	...	5
Mt. Barker	S	591	...	591	147	5	83	36	5	3	1	...	8	5	1
Albany	T	452	20	472	70	1	37	8	...	...	...	5	14	4	1
Nannup	U	622	10	632	12	1	10	...	...	...	...	1	...	...	...
Vasse-Jindong ...	V	622	...	622	15	...	12	...	...	...	...	...	1	1	1
Denmark	W	384	30	414	31	...	15	3	8	...	...	1	3	1	...
Northcliffe	X	575	7	582	30	3	20	3	...	...	...	...	2	1	1
Scotsdale	Y	393	...	393	9	...	7	...	...	...	...	1	...	...	1
Totals ...	...	12574	226	12800	1112	116	681	140	28	7	9	25	47	35	24
Percentages ...	...	...	...	...	8·68	·91	5·32	1·09	·22	·05	·07	·19	·37	·27	·19

No returns available for Forest Grove Unit.

It would appear from the information obtained, that either farmers are not culling their herds and are not suffering great losses from disease or else complete data is not being given to the Herd Recorders.

In the survey of the Brunswick Unit referred to above it was shown that the average wastage was 16.7 per cent. In the herd recording survey for 1946-47 it was 12.9 per cent., while in the year just completed it has fallen to 8.68 per cent. This suggests, if the figures were accurate, that the average working life of a cow is 12 years. This obviously is not so. An effort is being made during the current year to ensure that full and accurate information is collected.

The information gathered is intended to be used as a means of indicating to the Veterinary Service, districts where an unusual amount of difficulty, or any particular disease is occurring, with a view to concentrating attention on assisting the farmers.

Proving Bulls.

The influence of breeding upon the future quality of the herds must always remain a most important aspect for the consideration of dairy farmers. It has always been accepted that no general improvement can be achieved in inherent capacity for production unless heifers from the best cows, sired by good bulls, are retained for replacement of wastage in the herds. It has been proved, however, that this method alone in the average herd is a much slower means of lifting quality than is generally recognised. This is due to the fact that all the better-than-average cows in a herd do not consistently produce heifer calves. Further, some of the heifers that are actually born from the better cows do not survive.

Under Western Australian conditions the size of the herds is gradually increasing and, therefore, a greater number of heifers is retained than would be needed purely to replace normal wastage. Consequently, each year a number of heifers from below-average cows must be kept. It is obvious, therefore, that unless good bulls are used the rate of improvement may be very slow.

Emphasis in the past has been on the use of standard bulls—that is, purebred bulls from cows which under production recording have yielded more than the standard set at the particular age of testing.

Study of dairy cattle breeding and husbandry in recent years has indicated, however, that while in the absence of more information this method is sound, the only really reliable method of selecting a bull is to procure one which already has sired daughters all of whom are consistent in respect of high yields.

In an endeavour to provide farmers with information regarding the performance of bulls, both in purebred and grade herds, data is published each year in the respective reports showing the performance of the bulls which have been in use. Accordingly in this report, Table 9 shows details of the yield of all daughters of the various bulls used in grade herds during the past season. In this table only those animals which have had six or more daughters in production have been included. For the first time the yields are shown classified according to the age of the cows at calving.

TABLE 9.

BULLS WITH SIX OR MORE DAUGHTERS COMPLETING LACTATION.

Bull.	Breed.	Daughters.										Unit.	Owner.	Age of Bull.
		2 Years Old.		3 Years Old.		4 Years Old.		Mature.		Total.				
		No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.			
			lbs.		lbs.		lbs.		lbs.		lbs.			
Ardersier Sir Eion	Jersey	....	....	6	310.17	....	....	....	....	6	310.17	Pinjarra	H. Skidmore	Dead
Radyr Park Sept Lad	do.	7	294.85	....	....	....	....	2	354.00	9	308.00	Harvey	L. M. Temple	5
Murray Glen Lord Avon	Friesian	....	....	9	301.33	2	261.50	5	321.20	16	302.50	Harvey	F. Byrd	Dead
Werribi David	Jersey	....	....	5	303.33	....	....	1	271.00	6	297.83	Denmark	W. Middleton	9
Summerlea Peter	A.I.S.	....	....	....	....	....	....	7	297.00	7	297.00	South Cowaramup	A. W. Dempster	Dead
Wooroloo Noble 2nd	do.	....	....	11	253.27	3	314.66	5	366.20	19	290.57	Harvey	S. Fry	Dead
Koojan Banker	Guernsey	....	....	....	....	3	288.00	6	290.16	9	289.44	Albany	C. J. Jarrat A. Bracknell	Dead
Walgett Ruby's Noble	Jersey	..	..	3	296.33	9	307.66	6	256.33	18	288.66	Nannup	S. C. Maidment	Dead
Colinyn Mont Rose	do.	....	....	....	....	3	239.33	5	318.20	8	288.62	North Cowaramup	G. Penfold	Dead
Victoria Robin Hood	Red Poll	....	....	5	292.11	....	....	1	231.96	6	282.09	Mt. Barker	F. R. H. Pugh & Son	12
Plenarbor Master	A.I.S.	....	....	1	304.00	5	265.80	....	....	6	272.17	Pinjarra	S. Mullins	7
Brackenhurst Gibson Champagne II.	do.	....	....	10	251.50	3	268.66	14	259.50	27	257.55	Nannup	S. C. Maidment	12
Rosella Commander	Guernsey	4	257.50	6	256.50	....	....	....	....	10	256.90	Rosa Brook	T. F. Busby	6
Grassvale Designs Ruler	Jersey	9	201.15	3	268.66	1	226.50	10	305.55	23	256.45	Donnybrook	E. W. M. Trigwell	11
Melbury Chief	A.I.S.	....	....	....	....	....	....	10	247.00	10	247.00	Margaret River	J. A. Nilssen	16
Muresk Path Finder	Guernsey	....	....	....	....	1	191·00	5	255.00	6	244.33	Rosa Brook	T. F. Busby	12
Brookfields Bulwark	do.	1	165.00	4	239.00	1	278.00	....	....	6	239.16	Albany	L. Jordan	8
Denmark Rosa's Viscount	do.	....	....	1	204.00	3	250.33	14	236.14	8	236.72	Northcliffe	J. R. Daubney	12
Congelin Eminent Mariner	Jersey	....	....	1	181.50	6	244.00	3	258.00	10	236.15	Metricup	C. R. Irvine	7
Longridge Redman	A.I.S.	....	....	2	229.00	6	246.33	15	277.77	23	232.69	Waroona Pinjarra	H. J. Mullins S. Mullins	Dead
San Soucci Double Success	Jersey	....	....	....	....	1	217.29	8	232.79	9	231.07	Pemberton	H. Styles	14
Eungella Golden Star Bright	do.	4	232.50	2	223.00	....	....	....	....	6	229.30	Pinjarra	T. Abbott	Dead
Dunmore David	Friesian	....	....	5	240.80	8	217.87	....	....	13	226.69	Nannup	V. Scott	8
Sabina Vale Velvet Boy	Jersey	....	....	....	....	2	318.00	11	206.54	13	224.00	Nannup	A. Pollock	Dead
Rocky Glen Captain	A.I.S.	....	....	....	....	1	174.00	5	233.60	6	223.66	Albany	F. Pease	Dead
San Soucci Prince Winston	Jersey	....	....	1	187.98	3	257.50	2	186.82	6	222.36	Pemberton	H. Styles	Dead
Muresk Jeremy	Guernsey	3	165.33	4	234.00	1	235.00	3	249.66	11	219.63	Wilga Noggerup	R. Charteris	8
Ilginup Monarch Loyalist	A.I.S.	7	195.87	4	244.50	1	253.00	....	....	12	216.50	Waroona	L. Windus	8
Brookfield Bachelor	Guernsey	3	169.00	1	215.00	....	....	7	233.71	11	214.31	Margaret River	W. B. Wickham	12
Westby Grenadier	A.I.S.	1	210.00	2	209.00	2	215.50	5	204.20	10	207.20	Denmark	H. M. Bidwell	9
Summerlea Peer	do.	....	....	1	123.22	2	138.34	15	226.40	18	205.33	Ruabon	F. L. Torrent	Dead
Travalgan Rajah	Jersey	11	205.00	....	....	....	....	3	188.66	14	201.50	Wilga-Noggerup	Runciman & Inglis	6
Grantham Forward March	do.	1	208.00	1	206.00	2	209.50	2	187.50	6	201.33	Waroona	Bowles & Sons	7
Greenmount Silver King	do.	....	....	2	182.01	1	100.83	6	224.32	9	201.20	Donnybrook	M. A. Crute	Dead

TABLE 9—*continued.*

BULLS WITH SIX OR MORE DAUGHTERS COMPLETING LACTATION—*continued.*

Bull.	Breed.	Daughters.										Unit.	Owner.	Age of Bull.
		2 Years Old.		3 Years Old.		4 Years Old.		Mature.		Total.				
		No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.	No.	Butter-fat Average.			
			lbs.		lbs.		lbs.		lbs.		lbs.			
Denmark Damon	Guernsey	....	....	....	....	3	167.33	6	216.83	9	200.33	Northcliffe	A. V. Smith	16
San Soucci Prince Ingot	Jersey	....	....	....	....	....	....	7	191.56	7	191.56	Pemberton	A. J. Hulcup	8
Yokanup Ulerys Commodore	A.I.S.	1	175.80	....	....	....	....	5	188.12	6	186.07	Mt. Barker	C. H. Bailey	7
Colmyn Fairy Boy	Jersey	....	....	1	145.00	4	132.75	3	263.00	8	183.12	Metricup	G. M. Smith	12
Calcamine Justice	do.	6	177.07	....	....	....	....	....	....	6	177.07	Mt. Barker	A. K. Stirling	6
Gorge Rock Oxford Boy	do.	6	171.25	....	....	....	....	....	....	6	171.25	Mt. Barker	J. F. Bunker	4
Longridge Commander	do.	4	145.25	1	100.00	4	156.00	5	206.40	11	169.90	Margaret River	J. A. Nilssen	10
Mereworth Butter King	do.	7	163.28	....	....	....	....	....	....	7	163.28	Nannup	V. Scott	9
Wattle Hill Saar King	A.I.S.	10	136.30	3	204.80	....	....	....	....	13	152.11	Nannup	F. J. Oates	Dead
Summerlea Milkmaid Renown	do.	....	....	....	....	2	153.52	12	145.00	14	146.21	Nannup	Roberts Estate	9

A high producing herd in good pasture, Mt Barker.

It will be noted that of the nine leading bulls, seven are already dead and therefore their potential value has been lost. Of the 41 bulls listed, 15 are dead. This illustrates the problem with which dairy farmers generally are faced when they desire to select an animal which has been proved to be good. Under existing circumstances it appears that the finding of such an animal will be exceedingly difficult.

Data has been provided, notably by the Ayrshire Herd Society in Scotland, that the next best bull to a "proved" bull is the son of a "proved" bull, and therefore the obvious line of inquiry for a prospective buyer of a new herd sire, is to request full details of the animal offering, both in respect of the production of the material ancestry and also of the daughters and sisters of the main sires.

It can be shown that the herd sire is at least 40 times as important as any individual cow and therefore the additional time and possible expense involved in finding and buying a really good bull is justified.

Value of High Test.

The value of high butter-fat test in milk, combined with high milk yields is obvious, and emphasis has been placed on the wisdom of maintaining high quality in milk as a means of ensuring the greatest output of nutrients. This emphasis is reduced somewhat in respect to the areas producing whole milk, but even in these districts there is a weighty argument in favour of high quality

in view of the fact that surplus above whole milk requirements must be used for manufacturing purposes and that as time goes on this proportion is likely to increase.

The capacity for producing milk, and for producing milk of high butter-fat test, are characters which are inherited separately.

The farmer can improve the productive capacity of his herd by the use of bulls which are from strains, not only with records of high yields, but with which are combined the character of high test.

With a view to demonstrating the effectiveness of high test as a means of achieving a high yield, data in Table 10 was assembled from the records for the three years 1935-36, 1946-47 and 1947-48. It will be seen that the groups with the highest test have the highest average butter-fat yields; in fact there is almost a regular increase in the yields as the test rises.

Table 10.

AVERAGE PRODUCTION OF COWS COMPLETING LACTATION.

Grouped according to Test.

Test.	Summary of three years shown.				
	No. of Herds.	No. of Cows.	Average Milk.	Average Test.	Average Butter-fat.
			lbs.	%	lb.
3.1–3·5	5	113	4838.5	3.36	162·39
3.6–4.0	109	2076	5061.4	3.92	198.46
4.1–4.5	383	7323	4675.3	4.33	202.29
4.6–5.0	323	6086	4607.5	4.73	218.02
5.1–5.5	96	1513	4743.2	5.23	248.08
5.6 & Over	20	199	4814.0	5.71	274.42

Calf Marking and Sire Surveys.

Some disappointment can be expressed regarding the failure of many farmers having their herds tested to assist in the marking of the heifer calves. This is intended as the basis for a sire survey scheme, details of which will be announced before next season. While it is proposed that the performance of the various sires having six or more daughters under test in any year will be published as previously, detailed surveys of individual sires will be prepared on application by the members. These will be issued in three separate stages—a preliminary survey covering a number of cows with one lactation only. An intermediate survey will follow when a determined number of these cows have had a second lactation, while a final survey will be issued on the completion of a third lactation by probably a smaller number.

In view of this it is hoped that all testing members will co-operate with the recorders in ensuring that the heifer calves are marked, as this is the only means by which they may be identified later when they come into production. As the marking is recorded together with the breeding of the heifer, the sire of each marked animal coming into production will be known.

Speed of Milking.

An inquiry has been commenced into the average time taken in milking with machines and, while the data is not nearly complete, a preliminary view suggests that valuable information will be forthcoming. For example—for the period July to September the times taken by various sizes of milking machine were tabulated according to whether time taken per cow was six minutes and under, between six and ten minutes or ten minutes and over. The following table shows the results.

TABLE 11.

Size of Machine.	Speed of Milking: Minutes per Cow.			Percentage.	
	10 Minutes and over.	7–9 Minutes.	6 Minutes and under.	6 Minutes and under.	10 Minutes and over.
Units.					
6	3	3	....	6	64
5	8	2	1		
4	54	68	6	5	42
3	41	233	22	7	14
2	41	259	101	25	10

It will be noted that of those with an average time of six-minutes-and-under, 77.6 per cent. were two-unit machines, while 94.6 per cent. were two or three-unit machines. Of those taking ten minutes-and-over, 44.2 per cent. were machines of four-units or over. Further, of the two-unit machines 25 per cent. were in the six-minutes-and-under group.

It is proposed that this inquiry will be continued as there is no doubt, from the general evidence available showing milking times from four-and-a-half to 18 minutes per cow, a large number of farmers are taking an unduly long time to milk their cows.

From modern knowledge of the physiology of milk secretion, it is obvious that considerable loss of production must be occurring. It is intended that the data be prepared in such a way that farmers may see quickly the need for speeding up the rate of milking. It is clear already from the figures, that many farmers owning large machines can milk their herds more rapidly if they put out of action one or more units. There are several herds on which

two-unit machines are used, where the total length of the milking period for the herd is less than for herds of a similar size where four and five-unit machines are in action. It appears that some of the latter have been equipped beyond the capacity of the labour available to work efficiently.

Other Investigations.

Numerous other investigations into the influence of various factors and aspects of management on production are possible and it is planned that with a change in the routine of calculating production it will be possible for the recording officers to collect data which will be of value for these purposes.

Inquiries are envisaged into the influence of mastitis, fodder conservation and other phases of management.

Leading Herds.

The performance of some of the leading herds during the past year—according to size in the categories under-20, 20-30, 31-50 and 51-and-over cows—are shown in tables 12, 13, 14 and 15.

Table 12.

LEADING HERDS OF LESS THAN 20 COWS.

Name of Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average. lb.
G. Barnsby	Pemberton	16	Guernsey	359.13
W. Robinson	Cowaramup, North	8	Jersey and Guernsey	340.00
K. Fimmel	Harvey	19	Jersey	333.00
J. M. Barry	Scotsdale	12	Jersey and Jersey X Guernsey	301.21
E. Oregioni	Manjimup	15	Guernsey	289.30
G. M. Cabassi	Pemberton	18	Guernsey	288.25
F. Doak	Rosa Brook	14	Mixed	281.12
B. I. Morgan	Manjimup	7	Mixed	274.80
I. S. Baldock	Bridgetown	11	Jersey	271.00
J. Cox	Pinjarra	16	Mixed	269.81
W. Gane	Rosa Brook	14	Jersey and Shorthorn	266.71
E. A. Hansen	Margaret River	18	Mixed	264.22
J. MacClaren	Forest Grove	18	Jersey	262.00
R. White	Cowaramup, North	16	Mixed	259.00
H. Hawksford	Cowaramup, North	16	Shorthorn X Jersey	258.00
R. J. Henderson	Rosa Brook	18	Jersey and Guernsey	254.16
A. Miller	Harvey	18	Shorthorn	254.00
H. S. Redman	Denmark	18	Jersey	253.50

TABLE 13.

LEADING HERDS OF 20-30 COWS.

Name of Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average. lb.
O. Foan	Donnybrock	20	Jersey	379.85
G. Crooke	Margaret River	20	Jersey	379.05
W. Middleton	Denmark	21	Jersey	347.61
A. R. Testar	Harvey	22	Guernsey	345.00
D. Della	Pemberton	22	Guernsey	342.64
D. G. Spark	Pinjarra	27	Jersey	333.00
L. L. Bolt	Denmark	21	Jersey	321.30
J. A. Dowrick	Balingup	26	Jersey X Guernsey	320.00
M. Brennan	Balingup	26	Jersey X Guernsey	309.00
F. Campbell	Cowaramup, South	20	Jersey	304.80
K. Chapman	Wilga-Noggerup	26	Jersey and Guernsey	304.50
T. H. M. Lefroy	Cowaramup, North	23	Mixed	303.00
T. W. Jackson	Waroona	23	Mixed	300.00
A. Miller	Cowaramup, South	30	Jersey	299.93
A. Gibbs	Cowaramup, North	22	Mixed	299.45
L. J. Frost	Mt. Barker	23	Jersey	296.67
W. Price	Donnybrook	26	Jersey	295.08
F. Larsen	Cowaramup, North	22	Jersey	294.00
L. M. Temple	Harvey	21	Friesian X Jersey	292.00
E. Marston	Waroona	28	Guernsey X Shorthorn	288.43
C. B. Fennell	Margaret River	24	Shorthorn	287.83
J. Stephens	Scotsdale	24	Jersey	285.05
G. Penfold	Cowaramup, North	20	Jersey and Shorthorn	282.00
W. Donaldson	Cowaramup, North	20	Jersey	278.00
N. L. Murdoch	Metricup	25	Jersey and Jersey X Shorthorn	277.78
H. Harrison	Rosa Brook	29	Guernsey	277.13
C. E. Campbell	Forest Grove	26	Jersey and Guernsey	273.00
H. Silvester	Cowaramup, South	22	Shorthorn, Guernsey and Jersey	272.59
N. E. Marshall	Scotsdale	24	Guernsey	272.43
H. S. Moyes	Bridgetown	28	Mixed	270.20
V. Scott	Nannup	23	Friesian	269.78
R. Wright	Wilga-Noggerup	27	Mixed	269.70
D. Mott	Cowaramup, North	20	Guernsey	266.70
H. Morris	Cowaramup, South	21	Jersey	266.66
J. J. Littlefair	Pemberton	23	Mixed	264.29
R. Lang	Margaret River	29	Mixed	261.55
E. J. Arthur	Rosa Brook	24	Jersey and Guernsey	261.45
C. W. Plozza	Denmark	20	Jersey and Shorthorn	260.79
W. Duggan	Cowaramup, North	23	Mixed	259.00
S. Shirley	Cowaramup, North	23	Jersey	258.45
E. F. Hick	Scotsdale	22	Jersey	258.24
J. H. Bessell (Jr.)	Rosa Brook	22	Shorthorn and Jersey	257.63
L. M. Wetherly	Ruabon	25	A.I.S.	257.23
W. L. Still	Metricup	24	Mixed	256.27
A. C. Frost	Donnybrook	26	Jersey	254.96
H. Stuart	Cowaramup, North	22	Jersey	254.72
F. J. Smith	Balingup	28	Jersey	254·50
C. R. Payne	Bridgetown	22	Jersey	252·57
F. H. Dennis	Rosa Brook	27	Shorthorn	252.22
F. V. Hortin	Albany	24	Mixed	251.87
H. J. Clews	Cowaramup, South	27	Jersey, Guernsey and Shorthorn	251.58
McLoughlin Bros.	Wilga-Noggerup	22	Jersey	251.40
R. Charteris	Wilga-Noggerup	22	Guernsey	250.90
R. Benson	Donnybrook	30	Jersey	250.82
R. H. Brown	Cowaramup, South	21	Mixed	250.00

Table 14.

LEADING HERDS OF 31–50 COWS.

Name of Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average. lb.
M. Seia	Balingup	32	Jersey	312.00
A. B. Eckersley	Harvey	35	Jersey	311.00
A. W. & W. L. Langley	Cowaramup, South	48	Shorthorn	300.10
V. Dezotti	Bridgetown	43	Jersey	299.00
H. H. McNeill	Waroona	43	Shorthorn	298.91
E. R. White	Harvey	47	Jersey	293.00
J. H. Oldfield	Forest Grove	37	Shorthorn X Guernsey	289.00
G. White	Balingup	40	Jersey	283.00
Farr Bros.	Albany	34	Guernsey X Jersey	279.32
T. Maughan	Harvey	45	Mixed	277·00
S. C. Maidment	Nannup	46	Jersey and Shorthorn	272.00
P. Plozza	Nannup	35	Jersey X Shorthorn	267·00
W. H. Davis	Pinjarra	43	Mixed	261.37
V. Humphry	Pinjarra	32	Shorthorn	260.31
G. H. Dixon	Bridgetown	34	Jersey	258.00
J. E. Glendon	Ruabon	44	A.I.S.	256.85
W. K. Barnes	Harvey	45	Shorthorn	254.00
A. J. S. Angel	Manjimup	36	Guernsey	252.60
R. P. Reading	Vasse-Jindong	44	Mixed	251.73
H. Skidmore	Pinjarra	37	Jersey	251.46
P. J. Colum	Waroona	32	Shorthorn X Jersey	251.44
R. A. Clarke	Brunswick	41	Jersey	251.07

Table 15.

LEADING HERDS OF 51 COWS OR MORE.

Name of Owner.	Unit.	No. of Cows.	Breed.	Butter-fat Average. lb.
R. Beacham	Pinjarra	58	Shorthorn and Jersey	331.79
F. R. H. Pugh & Son	Mt. Barker	55	Mixed	280.52
S. Fry	Harvey	52	Shorthorn	277.00
E. Holthouse	Harvey	51	Mixed	273.00
Runciman & Inglis	Wilga-Noggerup	69	Jersey and Jersey X Shorthorn	264.40
J. Torrent	Ruabon	52	Jersey and A.I.S.	247.97
G. M. Dempster	Harvey	72	Shorthorn	241.00
Radford Park	Vasse-Jindong	67	Jersey	234.20
E. Keogh	Mt. Barker	56	Shorthorn and Jersey	231.58
R. A. & T. A. Jackson	Rosa Brook	61	Shorthorn, Jersey and Guernsey	230.93
J. Salerian	Waroona	63	Red Poll	228.17
W. Bailey	Balingup	54	Jersey X Guernsey and Shorthorn	210.00
H. P. Fry	Harvey	51	Shorthorn	203.00
J. R. Daubney	Northcliffe	64	Guernsey and Shorthorn	202.00

Table 16 shows the highest producing cow in each unit.

TABLE 16.

THE HIGHEST PRODUCING COW IN EACH UNIT.

Owner.	Unit.	Cow.	Breed.	Milk. lb.	Test. %	Butter-fat. lb.
E. Holthouse....	Harvey	Dumpy	Jersey	10,560	5.80	610.00
W. Price	Donnybrook	Daphne	Jersey	8,851	6.15	544.41
F. Doak	Rosa Brook	Maisie 1st	Shorthorn x Jersey	12,415	4.26	529.00
G. Crooke	Margaret River	Betty	Jersey	12,045	4.20	515.00
R. Beacham	Pinjarra	Sylvie	Shorthorn	11,060	4.60	510.00
G. Barnsby	Pemberton	Betty	Guernsey	6,960	7.28	506.76
A. W. and W. L. Langley	South Cowaramup	Ruby	A.I.S.	11,940	4.20	504.00
J. A. Dowrick	Balingup	Brownie	Jersey x Ayrshire	9,210	5.20	484.00
F. Larsen	North Cowaramup	Trixie	Jersey x Shorthorn	10,140	4.57	464.00
N. L. Murdoch	Metricup	Betty	Shorthorn x Jersey	8,424	5.49	463.00
R. A. Clarke	Brunswick	Florrie	Jersey	8,310	5.70	459.84
L. Winduss	Waroona	Annabella	Shorthorn	11,085	4.10	459.00
V. Dezotti	Bridgetown....	Betty	Jersey x Shorthorn	10,755	4.20	454.00
H. J. Shepherd	Mt. Barker....	Rona	Guernsey	9,780	5.30	453.36
L. L. Bolt	Denmark	Girlie	Jersey	9,063	4.90	448.26
S. C. Maidment	Nannup	Leo	Jersey x Shorthorn	9,791	4.50	445.00
Runciman and Inglis	Wilga-Nogger-up	Patsy	Jersey	7,940	5.60	443.00
Farr Bros.	Albany	Daisy	Guernsey	8,665	5.03	436.00
J. E. Glendon	Ruabon	Yvonne	A.I.S.	10,530	4.00	430.45
Radford Park....	Vasse-Jindong	Dixie	Jersey	7,535	5.50	429.00
A. J. S. Angel	Manjimup	Holly	Guernsey	8,973	4.70	426.00
J. H. Oldfield	Forest Grove	Wendy	Jersey x Guernsey	8,885	4.80	424.00
N. E. Marshall	Scotsdale	Primrose....	Guernsey	7,905	5.16	408.15
J. Adam	Northcliffe	Sue	Guernsey x Jersey	9,485	3.89	369.00

Co-operative Dairy Farmers Trophies.

Previously trophies were donated in the units for a variety of results. For example—the best cow, the best group of heifers, etc.

In the revised scheme only one series of trophies has been donated and these were awarded on the basis of the greatest improvement in yield over a three-year period. The trophies will be given as follows:—

First year of testing in any unit—The highest average.

Second year—The greatest improvement over two years.

In the following years—The improvement over three years.

The trophies for this purpose are donated jointly by the South-West Co-Operative Dairy Farmers Ltd., Bunbury and the Great Southern Co-Operative Butter Coy., Narrogin, and are known as the Co-Operative Dairy Farmers Trophies.

Details of the yields for 1946-47 and 1947-48 are shown in table 17.

Table 17.

THE CO-OPERATIVE DAIRY FARMERS TROPHY.

Owner.	Unit.	Average Butter-fat Production. lb.		Points Scored.
		1946–47.	1947–48.	
O. Foan	Donnybrook	344	380	4[illegible].20
A. R. Testar	Harvey	185	345	40.00
G. Barnsby	Pemberton	300	359	39.33
R. Beacham	Pinjarra	211	332	34.57
K. Chapman	Wilga	174	305	32.75
L. J. Frost	Mt. Barker	137	297	32.00
M. Seia	Balingup	201	312	31.71
F. Campbell	Cowaramup, South	184	305	30.25
W. Middleton	Denmark	274	348	29.60
V. J. Lowrie	Metricup	119	245	25.20
T. W. Jackson	Waroona	218	300	23.42
B. I. Morgan	Manjimup	189	275	21.50
H. S. Moyes	Bridgetown	188	270	20.50
W. G. McLaren	Albany	146	248	20.40
P. Plozza	Nannup	201	267	18.85
G. Penfold	Cowaramup, North	223	282	16.85
L. M. Wetherley	Ruabon	192	257	16.25
E. J. Arthur	Rosabrook	197	261	16.00
McSwain Bros.	Rosabrook	174	238	16.00
W. B. Wickham	Margaret River	138	211	14.60
C. E. Campbell	Forest Grove	223	273	14.28
V. R. Sales	Brunswick	137	196	11.80
J. M. Barry	*Scotsdale	....	301	....
R. P. Reading	*Vasse-Jindong	....	252	....
J. Adam	*Northcliffe	....	249	....

* New Units 1947–48 Season.

Particulars of production of each herd under test in the various units are given hereunder.

HARVEY C.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
A. R. Testar	22	656	345
K. Fimmel	19	635	333
A. G. Eckersley	35	570	311
Herd W	47	595	293
„ F	21	555	292
„ X	52	625	277
„ D	45	611	277
„ H	51	565	273
„ Y	18	605	254
„ K	45	604	254
„ Q	24	549	249
„ M	72	558	241
„ B	48	558	237
„ O	26	418	226
„ C	38	453	206
„ Z	51	422	203
„ U	51	426	185

FOREST GROVE K.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
J. H. Oldfield	37	619	289
C. E. Campbell	26	624	273
J. McLaren	18	539	262
Herd C	19	498	237
„ AE	34	484	220
„ G	17	426	209
„ AC	33	448	202
„ B	30	418	189
„ O	39	399	180
„ AF	17	364	172
„ P	40	397	170
„ E	11	380	155
„ Z	12	317	142
„ CF	31	293	140
„ CA	13	201	132
„ CB	19	294	131
„ AB	23	262	121
„ R	19	246	108

MANJIMUP O.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
E. Oregioni ...	15	645	289
B. I. Morgan ...	7	587	275
A. J. S. Angel ...	36	559	253
Herd J ...	26	508	231
„ D ...	16	539	229
„ G ...	22	552	225
„ L ...	18	459	211
„ V ...	24	422	209
„ A* ...	29	448	207
„ E* ...	12	378	205
„ N ...	19	514	202
„ U ...	50	464	196
„ S ...	41	420	192
„ T ...	22	396	192
„ K ...	51	416	186
„ C ...	30	436	180
„ E ...	19	382	178
„ B ...	30	434	169
„ P ...	25	463	167
„ M ...	31	379	158
„ X ...	32	377	140
„ R ...	16	293	129
„ D* ...	22	247	123

* Inverted.

MARGARET RIVER I.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
G. Crooke	20	764	379
C. B. Fennell	24	691	288
E. A. Hansen	18	597	264
Herd Y	29	623	262
„ N	11	528	247
„ X	29	520	241
„ E	23	538	229
„ XV	27	594	217
„ S	20	560	215
„ D	37	497	211
„ O	20	436	211
„ XY	19	492	210
„ G	17	448	205
„ XS	31	444	204
„ XT	22	475	192
„ A	49	509	189
„ P	48	456	184
„ B	22	391	177
„ XU	28	339	134
„ XR	53	281	124
„ XW	15	213	102
„ A*	4	178	95

* Inverted.

DONNYBROOK L.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
O. Foan	20	752	380
W. Price ...	26	541	295
A. C. Frost ...	26	467	255
Herd D ...	30	487	251
„ N ...	6	488	249
„ AD ...	25	476	241
„ Y ...	37	481	239
„ Q ...	22	421	228
„ B ...	43	439	206
„ J ...	29	391	206
„ W ...	29	382	200
„ U ...	8	445	195
„ X ...	32	388	191
„ AB ...	30	415	191
„ V ...	32	450	187
„ S ...	19	393	180
„ Z ...	24	401	178
„ F ...	20	342	161
„ AC ...	18	308	141

DENMARK W

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
W. Middleton ...	21	675	348
L. L. Bolt ...	21	710	321
C. W. Plozza ...	20	575	261
Herd A ...	18	492	254
„ J ...	20	568	241
„ E ...	30	563	230
„ C ...	12	497	225
„ I ...	15	486	214
„ T ...	6	473	201
„ O ...	40	511	200
„ U ...	17	437	196
„ V* ...	15	449	196
„ Y ...	19	418	191
„ V ...	29	416	182
„ R ...	18	390	178
„ F* ...	17	395	172
„ B ...	7	354	172
„ J* ...	26	341	158
„ K ...	14	276	119

* Inverted.

NORTHCLIFFE X.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
J. Adam ...	25	583	249
L. C. and A. W. Lewis	28	496	226
K. Rising ...	23	542	223
Herd K ...	22	518	216
„ L ...	12	431	214
„ D ...	64	483	202
„ A ...	24	444	198
„ V ...	34	449	192
„ Z ...	30	434	181
„ H ...	31	464	180
„ O ...	24	399	176
„ S ...	28	381	173
„ B ...	39	393	162
„ P ...	41	349	152
„ G ...	16	365	138
„ E ...	25	323	137
„ Y ...	22	309	130
„ F ...	39	306	125
„ M ...	26	251	109

NANNUP U.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
S. C. Maidment ...	46	648	272
V. Scott ...	23	771	270
P. Plozza ...	35	605	267
Herd U ...	42	569	240
„ D ...	36	513	205
„ L ...	28	384	203
„ X ...	48	474	197
„ AD ...	24	423	194
„ AB ...	18	341	183
„ F ...	45	451	181
„ T ...	29	347	177
„ AE ...	29	400	162
„ H ...	31	372	158
„ V ...	19	285	157
„ R ...	23	398	153
„ A ...	22	320	143
„ AC ...	17	336	130
„ S ...	21	348	126

COWARAMUP, NORTH, G.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
W. Robinson ...	8	652	340
T. H. Lefroy ...	23	686	303
A. Gibbs ...	22	659	299
Herd F ...	21	650	294
„ P ...	20	578	282
„ DD ...	20	562	278
„ O ...	20	509	266
„ G ...	23	580	259
„ I ...	16	602	259
„ CC ...	23	510	258
„ Z ...	16	547	258
„ N ...	22	491	254
„ EE ...	26	548	248
„ A ...	29	507	246
„ Q ...	12	528	245
„ S ...	17	482	241
„ J ...	25	510	239
„ E ...	28	483	231
„ AA ...	10	416	213
„ M ...	28	454	208
„ BB ...	15	417	205
„ U ...	41	423	203
„ X ...	38	453	202
„ C ...	32	373	176

MOUNT BARKER S.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
L. J. Frost ...	23	611	297
F. R. H. Pugh & Son	55	638	281
Cluett & Sons ...	32	544	245
Herd M ...	36	518	235
„ W ...	21	429	233
„ B ...	33	493	233
„ K ...	56	557	232
„ F ...	18	528	231
„ Q ...	24	525	228
„ Z ...	31	468	225
„ U ...	27	565	223
„ E ...	32	532	223
„ A ...	24	437	210
„ X ...	11	445	207
„ A*	24	517	207
„ Y ...	26	428	206
„ T ...	35	484	200
„ P ...	24	456	198
„ G ...	28	420	162
„ I ...	21	304	141
„ V* ...	8	361	133

* Inverted.

ROSA BROOK J.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
F. Doak ...	14	581	281
H. Harrison ...	29	613	277
W. Gane... ...	14	522	267
Herd X ...	24	569	261
„ E ...	22	554	258
„ N ...	18	530	254
„ L ...	27	586	252
„ K ...	33	541	245
„ F ...	27	584	238
„ T* ...	16	496	234
„ O ...	12	459	233
„ Y ...	30	449	232
„ U ...	61	516	231
„ F* ...	17	441	230
„ A ...	28	539	228
„ P* ...	16	485	220
„ C* ...	42	426	214
„ D* ...	31	464	209
„ M ...	14	452	207
„ B* ...	14	430	207
„ Z ...	29	431	191
„ U* ...	13	459	179
„ G ...	24	364	171
„ A* ...	15	325	157

* Inverted.

WILGA-NOGGERUP R.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
K. Chapman	26	582	305
R. Wright	27	642	270
Runciman and Inglis	69	525	264
Herd D	22	474	251
„ A	22	527	251
„ E	6	463	231
„ F	26	435	228
„ B	24	470	213
„ N	7	452	210
„ L	18	478	199
„ P	19	434	199
„ U	15	414	196
„ C*	22	485	183
„ M	23	461	191
„ H	15	376	187
„ Y	24	404	152
„ Q	48	339	150
„ Z	17	410	149
„ J*	41	368	137
„ V	10	334	135
„ S	18	242	123

*Inverted.

PEMBERTON P.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
G. Barnsby	16	558	359
D. Della	22	780	343
G. M. Cabassi	18	672	288
Herd A	23	575	264
„ M	21	569	247
„ K	10	560	240
„ Y	33	481	228
„ P	18	479	227
„ W	19	563	226
„ G	15	498	222
„ O	18	491	221
„ D	23	481	201
„ Q	16	440	200
„ T	35	404	180
„ C	23	386	179
„ R	12	376	170
„ S	31	402	166
„ Z	7	374	165
„ X	23	359	164
„ L	15	376	163
„ U	21	356	155
„ J	8	293	134
„ V	32	299	132

BALINGUP M.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
J. A. Dowerick ...	26	680	320
M. Seia	32	664	312
M. Brennan ...	26	674	309
Herd N ...	40	546	283
„ A ...	28	535	254
„ BE ...	27	540	247
„ BF ...	11	546	245
„ BC ...	11	582	234
„ BN ...	15	488	231
„ R ...	40	449	228
„ BA ...	48	551	222
„ BH ...	54	487	210
„ D ...	30	421	206
„ BJ ...	24	433	199
„ V ...	70	491	192
„ C ...	29	411	185
„ BK ...	21	352	166
„ BG ...	29	347	158
„ F ...	21	345	154
„ BM ...	13	281	115
„ P ...	22	297	109
„ BL ...	44	262	108
„ BD ...	4	225	98

METRICUP F.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
N. L. Murdoch ...	25	588	278
W. L. Still ...	24	626	256
E. Smith	12	513	247
Herd F ...	15	618	245
„ D* ...	20	572	239
„ E* ...	12	558	238
„ A ...	32	568	232
„ G* ...	29	552	218
„ L ...	14	551	203
„ Y ...	31	427	198
„ T ...	46	465	188
„ Z ...	19	456	181
„ O ...	23	471	174
„ K* ...	58	417	169
„ J* ...	28	358	149
„ Q ...	18	327	136
„ A* ...	29	336	135
„ X ...	58	325	129

* Inverted.

BRUNSWICK D.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
R. A. Clarke ...	41	465	251
J. Gilmour (Jun.)	35	506	236
V. Robinson ...	31	475	222
Herd T ...	33	438	221
„ F ...	29	497	220
„ W ...	42	516	219
„ J ...	47	429	218
„ U ...	53	497	208
„ S ...	43	459	205
„ O ...	24	477	196
„ N ...	27	434	192
„ X ...	24	425	179
„ R ...	37	352	150

RUABON E.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
L. M. Wetherly	25	618	257
J. E. Glendon ...	44	632	257
J. Torrent ...	52	602	248
Herd Z ...	43	520	220
„ T ...	27	504	218
„ Q ...	28	525	215
„ H ...	38	494	211
„ A ...	39	460	207
„ U ...	29	456	200
„ B ...	57	496	198
„ G ...	42	434	192
„ W ...	33	446	188
„ X ...	24	422	185
„ J ...	25	447	180
„ Y ...	41	379	150
„ S ...	20	384	146

BRIDGETOWN N.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
V. Dezotti ...	43	610	299
I. S. Baldock ...	11	612	271
H. S. Moyes ...	28	706	270
Herd Z ...	34	497	258
„ P* ...	22	520	252
„ W ...	39	478	249
„ S ...	39	507	222
„ IX ...	19	489	219
„ R* ...	20	443	217
„ L ...	30	466	215
„ T ...	26	438	196
„ L* ...	19	415	190
„ V ...	41	398	189
„ A* ...	12	439	189
„ B ...	25	437	183
„ Q ...	56	443	174
„ T* ...	40	366	170
„ Y ...	21	396	170
„ K* ...	14	383	160
„ X ...	21	386	156
„ Y* ...	10	325	152

* Inverted.

ALBANY T.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
Farr Bros. ...	45	564	279
F. V. Hortin ...	24	580	252
W. G. McLaren ...	18	526	248
Herd W ...	29	591	246
„ A ...	29	484	239
„ K ...	20	491	237
„ M ...	21	462	224
„ Z ...	18	505	222
„ U ...	15	513	219
„ N ...	27	510	217
„ B ...	12	458	217
„ C ...	24	545	212
„ X ...	13	496	212
„ H ...	37	434	208
„ A* ...	19	459	207
„ O ...	24	451	206
„ P ...	25	431	199
„ V ...	15	449	197
„ R ...	31	359	146

* Inverted.

PINJARRA A.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
D. G. Spark	27	672	333
R. Beacham	58	744	332
J. Cox	16	611	270
Herd X	43	569	261
„ F	32	661	260
„ R	37	509	251
„ P	25	610	241
„ Y	18	418	215
„ K	32	429	204
„ S	31	481	200
„ Z	67	501	197
„ J	25	439	196
„ U	54	452	192
„ O	38	404	183
„ G	18	381	169
„ W	34	378	152
„ V	14	214	116

WAROONA B.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
T. W. Jackson	23	641	300
H. H. McNeill	43	655	299
E. Marston	28	639	288
Herd K	32	646	251
„ E	11	504	248
„ V	50	637	246
„ J	34	536	245
„ I	24	505	238
„ R	31	539	238
„ H	27	502	229
„ M	63	488	228
„ S	16	515	226
„ U	20	504	223
„ B	24	473	220
„ T	30	458	220
„ Q	20	438	188
„ P	35	420	178
„ O	9	321	148

COWARAMUP, SOUTH, H.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
F. Campbell ...	20	590	305
A. W. and W. L. Langley ...	48	765	300
A. Miller ...	30	589	300
Herd Q ...	22	619	273
„ MO ...	21	562	267
„ J ...	27	552	252
„ R ...	21	623	250
„ W ...	20	583	250
„ AA ...	11	500	243
„ DD ...	35	604	233
„ HH ...	15	556	228
„ O ...	21	515	214
„ KK ...	11	482	202
„ EE ...	17	443	190
„ GG ...	15	446	188
„ U ...	7	361	146

SCOTSDALE Y.

	No. of Cows.	Milk Average.	Butter fat Average.
		gals.	lbs.
J. M. Barry	12	628	301
J. Stephens	24	565	285
N. E. Marshall	24	572	272
Herd C	22	522	258
„ Z	19	495	245
„ M	28	532	230
„ D	18	467	226
„ N	41	472	222
„ B	16	460	216
„ S	15	407	211
„ A	12	486	211
„ F	24	372	172
„ I	20	357	155
„ L	15	311	142
„ H	20	340	136
„ J	43	270	119
„ K	24	245	109

VASSE-JINDONG V.

	No. of Cows.	Milk Average.	Butter-fat Average.
		gals.	lbs.
R. P. Reading	44	601	252
Radford Park	67	477	234
S. A. Grey	14	455	224
Herd G	36	484	218
„ A	33	475	208
„ L	20	506	208
„ P	51	474	195
„ T	34	419	193
„ I	21	471	192
„ J	24	456	181
„ H	22	414	179
„ R	20	425	174
„ O	24	421	173
„ N	29	360	147
„ E	33	336	140
„ F	19	361	139
„ D	20	325	138
„ C	27	271	117
„ S	9	197	85

SOIL CONSERVATION.

Methods for the Control of Water Erosion.

By L. C. Lightfoot—Senior Soil Conservation Officer.

SUMMARY.

Water Erosion is Taking Toll of the State's Soils.

Soil erosion by water action is common in our agricultural areas, but rarely severe. The region receiving 15 to 25 inches of rain a year is most affected.

How Does Water Erosion Take Place?

Raindrops batter bare soil which is thrown up in the splash and falls mostly downhill on sloping land. The battered soil usually absorbs less water. So run-off starts earlier and is greater. Moving films of water cause **sheet erosion** *and tend to concentrate and cut causing* **gully erosion**. *Exhausted soils erode more easily.*

How to Control Water Erosion?

Cover on the surface protects the soil by absorbing the energy of pounding raindrops and by checking water movement. Dense pasture gives the best surface cover. Fertile soils resist erosion better. Improved pasture in crop rotations is the best way of making soils more fertile. Subterranean clover is the best plant for improving pasture and is already causing an agricultural revolution in many districts by making exhausted soils fertile. These principles and their application are discussed, and the additional use of mechanical methods where needed.

Western Australia has the opportunity to save and improve the soil before irreparable damage is done. Exhausted soils can usually be improved. But when the topsoil itself is carried away by erosion, the problem of making subsoil farming pay is frequently insoluble.

SOIL EROSION CAUSED BY WATER ACTION IS COMMON IN WESTERN AUSTRALIA.

In Western Australia, the most urgent need for making soil conservation methods the basis of farming practice, is on sloping land in the fifteen to twenty-five inch rainfall areas of the South-West Land Division. Evidence of soil erosion is already widespread from Northampton to Gnowangerup, but damage as yet, is rarely severe. This erosion has been caused mainly by the uncontrolled run-off of rainwater not absorbed by the soil. Hence this article is written principally with the needs of this part of the cereal and sheep areas in view.

HOW DOES WATER EROSION TAKE PLACE?

Raindrop Pounding.—If rain is watched, it will be seen that each drop hits the soil surface and throws up a splash like a small bomb exploding. (See Fig. 1.) Recent investigations have shown that rain falling on bare soil does two things:—

1. Causes soil movement by raindrop splash.
2. Slows up water absorption by the soil, either by the formation of a dense surface skin or of a pasty mass of soil and water.

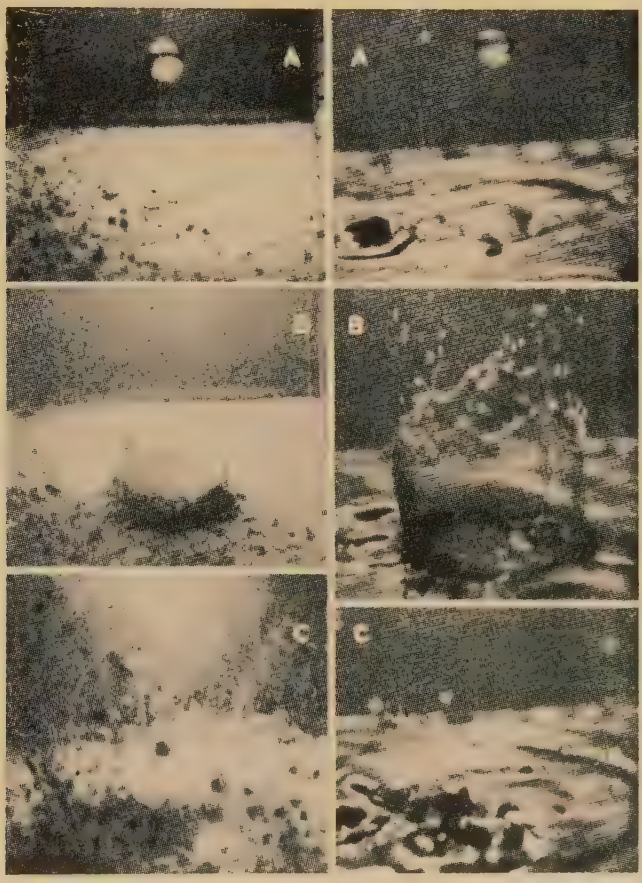


Fig. 1.

Y. Z.

Fig. 1Y: A large drop striking loose, powdery soil resembles, in slow motion, the blast of an air bomb. A: Just before striking. Notice the absence of any tail on the drop. B: Just after striking C: Four-hundredths of a second later, the air is filled with flying soil particles.

Fig. 1Z: When the soil is covered with a film of water, the principal effect of drop impact is to create turbulence. A: Just before striking. Notice the absence of any tail on the drop. B: Just after striking, the soil surface is discernible through the transparent walls of the liquid cylinder. C: turbulent wake left by the collapse of the walls of the cylinder.

(Photography by Edgerton, Germeshausen and Grier) from Agricultural Engineering, Vol. 21, No. 11, November, 1940.

On flat lands, these effects do not result in water erosion, but on sloping lands, splash falls mostly downhill. It has been shown that up to 75 per cent. of the splash falls downhill on a 10 per cent. slope. As the splash contains up to 40 per cent. of soil, raindrop pounding alone without running water, can cause soil erosion on slopes. (See Fig. 2.)

Fig. 2.

Vertical marks indicate paths of falling raindrops, parabolic curves indicate trajectories of soil and water particles which splash from the soil surface as part of the reaction to the impact.

(From Agricultural Engineering, Vol. 25, April 1944.)

Sloping Soil and Running Water.—The surface sealing effect of raindrop battering causes much more run-off. Water running off sloping land carries soil particles thrown up by raindrop splash, and moves in a shallow sheet carrying a thin layer of soil. This effect is known as *sheet erosion*, and is very hard to detect. It is frequently the most serious form of erosion and may go on until most of the top soil is carried away, before becoming obvious.

Running Water Tends to Concentrate and Cut.—As water moves downhill it tends to concentrate in hollows and cut small grooves known as *rills*, or deep trenches known as *gullies*. Trenches about 18 inches wide and 10 to 12 inches deep or bigger, are normally called gullies.

Rill erosion is easier to detect than sheet erosion, but is easily worked over with cultivating implements and forgotten. It is therefore, usually as neglected as sheet erosion. Continued washing in the same rills, enlarges them into gullies. Uncontrolled gully erosion has ruined parts of some paddocks in Western Australia for cultivation, and has caused the abandonment of whole regions in the United States of America. (See Fig. 3.)

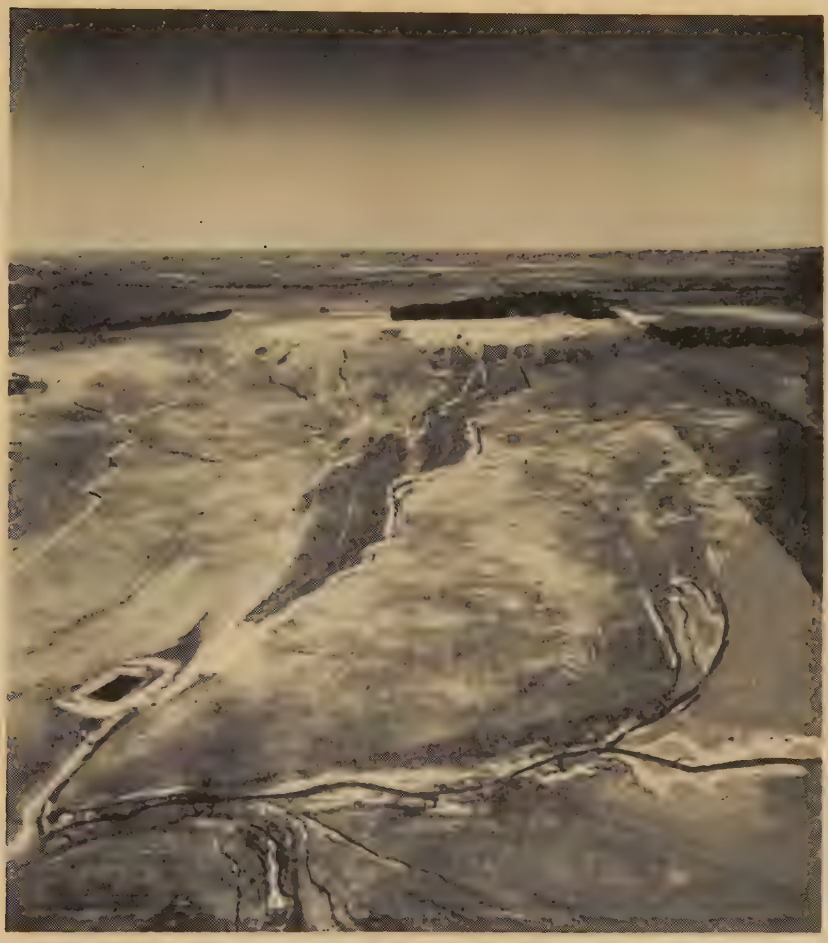


Fig. 3: Gully erosion has already made part of this wheatbelt paddock unfit for cultivation. Some of the gullies obviously follow old cultivation lines straight downhill. The gully on the right is extending uphill and unless adequate control measures are taken the whole paddock will become uncultivable. Improved pasture would probably arrest further erosion until parts of the paddock could perhaps be protected for safe cultivation by contour banks.

—Airphoto: Kingsley Watson.

Deposits of Erosion Debris.—Frequently, transported soil and sub-soil are deposited by running water on fertile land in the valleys where slopes are more gentle. This sediment is often infertile and damages good land. (See Fig. 4.)

HOW TO CONTROL WATER EROSION?

Main Needs are Surface Cover and Soil Fertility.—Investigation has shown that cover above the surface protects the soil against the poundings of raindrops. A sufficiently dense cover prevents the raindrops from throwing up soil in the splash as the force of the drops is absorbed by the cover, not by the protected soil underneath. The soil is also protected against the formation of a surface sealing skin and thus the rate of water absorption can continue undiminished. In addition to absorbing water more quickly while rain is falling, the soil is also

Fig. 4.—Erosion deposits in the Northam district. The lighter area above the fence posts is a deposit of soil and subsoil from the small gully above it. This gully is hardly bigger than a large rill.

Photo—Govt. Printer.

able to absorb much more water up to the limit of its capacity to hold it. In contrast when the sealing effect is present to a very high degree, dry soil has been found two inches below the surface after heavy rains. In addition, the presence of cover on the soil surface greatly slows up the rate of moving water when run-off does occur during periods of intense rainfall.

On farm lands, surface cover is most economically provided by crops or pastures. The efficiency of plant cover in giving soil protection, depends on the density of the stand and the amount of soil left uncovered. Living plants use great quantities of water during growth, mostly between 300 and 1000 times the weight of the dry matter formed in the plant. If there is any tendency to excess water in the soil, living plants are desirable. But obviously, cover is effective whether the plants are alive or dead, *as its principal functions are to absorb the force of the falling raindrops before they hit the soil surface, and to slow up the rate of moving water when run-off occurs.* The most efficient plant cover is provided by plants which grow densely, near the soil surface. Improved pastures do this job best.

These findings are of the greatest importance, and emphasize the need for plant cover on the soil surface during the longest possible part of the rotation. Further, the need for a different outlook when gauging carrying capacity is

Fig 5A.

A.—Light land at Wongan Hills sown to clover 1941, except the light coloured strip. The clover was ploughed and seeded to wheat in autumn 1947, and yielded better than 30 bushels an acre. In 1948 wheat was again seeded. Note better crop and darker soil where five years of clover pasture has added organic matter to the soil. Photo taken on 23rd June, 1948. —Photo G. H. Burvill.

Fig. 5B.

Photo taken October, 1948, on same strip as in A, but on the other side. Estimated wheat crop on old clover land at right, 21 bushels, and where clover not seeded, 7 bushels an acre. This land was also under wheat in 1947.

—Photo G. H. Burvill.

emphasized. Some of the most serious water erosion has occurred on pasture lands grazed bare. In the long-run, it is likely to be more profitable to leave some pasture to protect the soil, because when topsoil is lost, production and income decline, and when much topsoil is lost, productive capacity is usually impaired for a long time.

Soil Fertility.—Investigations have shown that fertile soils resist erosion best. The need to maintain and improve fertility then, is important to protect the soil from erosion, and to protect farm income.

Improved Pastures Best Meet Needs for Soil Cover and More Fertility.—Clearly, improved pastures green or dry, best meet the need for dense cover close to the ground providing they are not overgrazed. Legumes such as clover and trefoils are especially valuable for grazing on account of their high protein content, and for soil improvement because the bacteria in their root nodules are able to fix nitrogen from the air, and this eventually enriches the soil when the plant is grazed or dies.

Subterranean Clover Improves Pastures.—Subterranean clover is by far the most valuable legume for improving pastures in south-western Australia. It grows well on practically all soils where there is enough rain, and on most soils of medium and light texture in the 15-25 inch rainfall zone. In the northern agricultural areas, it needs rather more rain than for similar soils in the central and southern parts.

The establishment of good stands of clover needs longer pasture periods than has been the rule in wheat belt rotations, unless initial seeding rates are very heavy, and its introduction frequently means adjusting the farm rotation.

Crop Rotations.—The practice of crop rotation developed from the need to maintain and improve soil fertility and production, and the suitability of any rotation to a particular area will be measured by the success of the rotation in fulfilling these needs. Periods of pasture are desirable on all soils and in all types of mixed farming. *Numerous experiments and the experience of farmers generally, in Australia and overseas, have shown that the most effective and economical method of improving soil fertility is by the inclusion of a pasture period in the rotation.* (See Fig. 5.)

Clover often takes from three to five years for good establishment and gives good results for up to six or seven years. The adoption of much heavier rates of seeding, up to 10 to 15 lb. per acre by farmers who are gathering their own seed, has given good stands in one year.

Clover Disease.—There are the difficulties associated with the breeding of sheep grazed on pastures dominated by the Dwalganup strain of subterranean clover used in the wheat belt. But the Department of Agriculture continues to advise farmers to extend their areas of improved pastures by planting more Dwalganup subterranean clover because of its outstanding value in crop rotations. (See Figs. 5A and 5B.)

Other Legumes Needed.—Clover does not meet all needs for increased carrying capacity and soil protection and improvement in these areas. The Western Australian Blue Lupin is also a valuable legume for these purposes.

Barrel clover and burr trefoil are useful where they do well, mostly on soils of medium and heavy texture. Peas are grown to a minor extent. The search for other legumes is proceeding actively and a vetch (*Vicia eurillia*) has given promising results on the Departmental Research Stations.

Subterranean Clover Pre-eminent for Soil Conservation.—But subterranean clover is more adaptable to most situations than these other legumes, and thus remains pre-eminent for soil conservation purposes in south-western Australia.

Perhaps the most important immediate aim of the Soil Conservation Service of Western Australia is to encourage the establishment of clover wherever soil and climate permit.

Surface Cover on Very Poor Soils.—Cereal rye is very useful for establishing cover on areas where other crops and pastures have failed as it will make moderate growth on exhausted, deficient and eroded soils. It has made good cover on steep eroded slopes and is likely to assist establishment of subterranean clover or lupins in such cases. Seeding at 30 to 50 lb. with superphosphate at 80 to 100 lb. an acre is recommended for cereal rye. (See Fig. 6)

Fig. 6.—Cereal rye has made good cover on this poor, deficient soil, which had been as bare as the unseeded foreground. This cover will assist contour working and contour banks to control water erosion on lower sloping land. —Photo. Govt. Printer.

*Working the Land**—Fallowing as practised in Western Australia leaves the soil bare for many months and greatly increases the erosion hazard on sloping lands. A rough cloddy surface absorbs water better and resists erosion better than a fine mulch. Soils on which good subterranean clover pastures grow,

* See G. H. Burvill "Changing Ideas in Soil Conservation," Journal of Department of Agriculture, W.A., Vol. 22, March, 1945, pp. 3-10, reprinted as Leaflet 809.

will in most cases produce cereal crops without a period of bare fallow. Many sloping lands will need contour working or contour banks if they are to be fallowed safely.

MECHANICAL METHODS FOR CONTROL OF WATER EROSION.

Unfortunately, there are some lands which by reason of soil type and slope, cannot safely remain in cultivation without more protection than the measures already suggested. In such cases, resort must be made to what are known as mechanical methods of erosion control.

Contouring.—Contouring refers to any cultivation practice or mechanical treatment of land applied across the slope on the level, that is on the contour. (See Fig. 7.) It has been customary to work round and round paddocks regardless of slope, but on lands vulnerable to water erosion, this practice must be modified and contour working adopted.

Contour working means that all field operations are done around the hillside, on the level across the slope. The machines of course, are tilted by the slope of the ground, but they work along lines joining points of equal level.

Fig. 7.—Contour working between contour banks in the Northam district. Note contour seeding (lower centre) and reclaimed gully (centre) where bank curves uphill. This gully was ploughed in and reclaimed after higher banks were built to divert possible run off from the upper slopes. Other old gullies are also visible. Contour working between these banks was not as inconvenient as expected, and less power was required. Airphoto—Kingsley Watson.

Extent of Need for Contouring.—Contour working is likely to be needed on all land suitable and used for cultivated crops in the 15-25 inch rainfall zone, having slopes between three per cent. and 10 to 12 per cent. Land slopes of one-and-a-half to three per cent. may require contour working in special cases.

For practical purposes, contour lines may be pegged out from three to five chains apart, and the area between each pair of lines worked round and round as a land. This will keep most of the working, except at the ends, nearly on the contour. Every plough furrow and combine ridge will help to hold rain on the soil where it falls, till absorbed. The disadvantages of contour working are the extra turning required, especially as one contour line is rarely parallel to the next, and the extra time taken to cover the ground. In Western Australia these have been less than anticipated, and are outweighed by the conservation of both soil and water. When ploughs are being used on the contour, much turning may be saved by finishing the odd shaped pieces in the middle of lands with the scarifier. The corners should not be cultivated or drilled unless this is done before working round and round. Fuel consumption is lower by about eight to ten per cent. as less power is needed to work on the contour.

Contour Pasture Furrows.—Land steeper than 10 to 12 per cent. in slope, that is with 10 to 12 feet fall in 100 feet along the ground, should not be used for arable farming except in special circumstances. Such land is better used for pasture. In many cases, contour pasture furrows will be needed to help protect the soil against water erosion. These are furrows ploughed around hillsides joining points of equal level, that is on the contour, and may be made with a plough or a suitable grader. (See Fig. 8.) The grader-ditcher is suitable

Fig. 8.—Contour furrows at Camden, New South Wales, ploughed in 1943 on bare hillside. This photo taken August, 1946, shows grass cover established since contour furrowing. When sloping land becomes bare big rains sometimes wash all seeds from the surface. Contour furrows help to hold seeds as well as water on sloping lands.

Photo—L. J. H. Teakle.

for this work on slopes up to 15 per cent. Spacing is varied according to circumstances and is commonly eight to 30 feet. Contour pasture furrows hold run-off water for absorption by the soil, serve as convenient markers for top-dressing, and necessitate contour working for pasture renovating. A disadvantage is that sheep sometimes get down in them and need help to get up.

The limited experience of contour pasture furrows so far available in Western Australia has shown good results in helping pastures on steep land to control loss of top soil. In some cases, pasture furrows have effectively stopped gully erosion and allowed effective reclamation. The furrows should be blocked near rills and gullies to make sure they do not serve to bring water into them. New furrows should be watched during the first heavy rain and blocked where needed as most furrows are off the true contour in places.

Contour Banks.—There are many areas where contour working and sound rotations of crops and pasture will together be inadequate to control erosion if cropping is continued. These will comprise sloping lands already suffering from gully and sheet erosion; probably most of the steeper slopes of between five per cent. and 10 to 12 per cent., and the more readily erodible soils steeper than two to three per cent. in slope. In such cases, contour banks will be needed in addition to other methods previously mentioned, which are suitable for application in the particular paddock.

Contour banks are ridges or banks of soil built at intervals across the slope. (See Figs. 7 and 9) Commonly, they are given a small variable grade of from one or two inches per 100 feet at the beginning, to four inches per 100 feet at the outlet end. In some circumstances, this fall is increased to six inches per 100 feet. Such contour banks are known as the drainage type and provide a wide shallow water channel above each bank, which during heavy rains intercepts run-off water flowing downhill. These take the run-off slowly across the slope, and must discharge into a waterway that will dispose of excess water safely. By this method water is not allowed to run far enough downhill to cause gully formation, and sheet erosion is reduced to a minimum. More detailed specifications of contour banks recommended for Western Australia are given in a later section. (See Fig. 9.)

Contour banking is the most costly method of controlling soil erosion and for success must be supported by such other methods as are suitable to the needs of each piece of land. It is a modification of hillside terracing, a soil conservation method used by man for many centuries. Contour banks like contour lines, must be set out with an accurate levelling device, and the water channels tested again after the banks have been built with plough or grader. In Western Australia, contour banks set out by eye have failed, but those set out with a level, and given some attention for maintenance, have been successful. Gully reclamation increases costs, and where contour banks are required, they should be built before soil erosion occurs.

Our agricultural areas receiving less than 15 inches of rainfall a year, do not show the same evidences of water erosion, but will need some of these methods in some places. Areas receiving more than 25 inches a year, are generally protected by pasture and have suffered comparatively little soil erosion. But where frequent cultivation is practised, particularly in orchards, much top soil has been lost. Many orchards require some contour drains to help prevent water erosion.

Scale of this photo: 1 inch = 8 chains approximately.

Fig. 9: Aerial photographic plan of portion of an area in the Northam district protected against soil erosion by a system of contour banks. The hill top is at the top of the photo. and the land slopes generally towards the bottom of the picture. A ridge runs from top to bottom of the photo. to the left of the centre fence and is indicated by the contour banks curving towards the bottom and back again. Banks on the right of the ridge are graded to discharge into the waterway shown at the top right and those on the left to run the other way to the fence at the left. This runs down a valley generally well grassed. The double lines to the left of the left of the ridge from top to centre define a low rocky ridge. Banks discharge into this on the right and start again on the left still running to the left fence. At the bottom left three gullies join, the middle one is nearly one chain wide at the top and six to eight feet deep. A number of reclaimed gullies cross the contour banks roughly at right angles and some of these are clearly shown in the photo. The paddock at bottom right has been contour banked since the photo. was taken.

—Airphoto: Kingsley Watson.

Gullies.—Many farmers do not become aware that soil erosion is robbing them of the precious top soil until gullies appear, and make their paddocks awkward to work. (See Fig. 3.) They are then anxious to treat them and reclaim the gullies. *The important thing is first to deal with the conditions which caused the appearance of those gullies.*

Until this is adequately done, attempts at gully reclamation mostly serve to accelerate the gullying process. The need to prevent gullies or to treat them in the earliest stages after first dealing with the causes, is well put by H. H. Bennett, Chief of the United States Soil Conservation Service, in his book "Elements of Soil Conservation." Bennett says (pp. 246-247):—

"It is easier to prevent the development of gullies than to control them after they have formed. Gullying usually is preceded by sheet washing and therefore may be prevented to a large extent by taking the steps necessary to check such surface washing. However, constant precaution is necessary on sloping land to prevent the formation of gullies through the enlargement of minor channels formed by farm roads, wheeled machinery, livestock trails, temporary drainage ditches, and the excavations of rodents. (See Fig. 10.) Usually, rather simple measures such as the relocation of roadways as nearly as possible on the contour, development of minor ridged checks across roads, filling of ruts and rodent tunnels with straw or rock, and the relocation of fences in order to shift stock trails, are sufficient to check many incipient gullies, if used in time.

Fig. 10.—This gully in the Greenhills district was formed on an old road which runs straight downhill through the paddock. The slope varies from about 5 to 8% and falls towards the bottom of the photo. The gully is 6 feet deep in places and up to 8 feet wide on top. Photo—Govt. Printer.

"When the cost of gully control exceeds the value of the land protected, the work may not be justified unless it serves to protect adjacent land, reservoirs, waterways, buildings, bridges, highways or other downstream property. After a gully has eaten its way to the head of a watershed, activity usually ceases. If it is merely protected from livestock, volunteer vegetation generally will establish a suitable protective cover. *But when a gully starts advancing up a watershed slope, there is immediate necessity for employing intensive control measures.*"

Generally speaking then, gullies are to be avoided rather than controlled after they are formed. But there are already numerous gullies to be dealt with. It is important to remember in these cases, that gully reclamation depends firstly, on the same principles as control and prevention of water erosion generally. The most important thing is to absorb water where it falls on the watershed which has caused the gullying. In most cases, where gullies have already formed, measures such as improved pastures may be adequate to arrest gully erosion if a good stand of pasture, particularly with clover, can be established. Many cases are known in Western Australia where clover has not only stopped further gullying, but has enabled the gullies to heal in the course of a few years. (See Fig. 11.)

Fig. 11.—On this Northam farm pasture has stopped active erosion in these gullies which are gradually being healed. Cultivation will be continued on the hill top with contour bank protection, the steep hillsides will be retired to pasture and contour furrowed, and the slope in the foreground will be retained for cultivation by contour bank treatment. All working will be on the contour, and a longer period of pasture improved by subterranean clover will be included in the rotation. These gullies will then have been safely reclaimed. The slope in the foreground is about 10% and falls towards bottom of picture.

Photo—Govt. Printer.

In gullied land where cultivation is to be continued, reclamation of gullies is unsound unless provision is first made to keep run-off out of them by diversion drains or systems of contour banks on the watershed which has caused the gullying. When this is done, even quite large gullies may be ploughed in with a disc plough in a few rounds, using 10 to 12 feet of chain and dropping the furrow wheel into the gully. It is fairly simple to make gullies crossable by big machinery for contour working between contour banks in this way, but unless such mechanical protection is given first, attempts at gully reclamation by ploughing-in are more likely to enlarge gullies than reclaim them. It must be admitted, however, that this depends on the circumstances in each particular case. Sometimes the ploughing-in of gullies, particularly if they are fairly small, is a fairly good risk after the first rains, but they should be seeded heavily and well fertilised as soon as ploughed-in. If this is done, the plants will hold the soil safely in a few weeks providing heavy rain does not wash out the loose soil before it is held by pasture or crop. In some districts and on some sites, this will be moderately safe, where

in other districts and other sites it would be almost certain to increase the trouble rather than overcome it. The chances can only be estimated on the spot, and local knowledge is desirable.

Other Gully Treatment.—Efforts to establish plant growth in gullies by hand planting of grasses, clovers, shrubs and trees are often worth while, especially in big V-shaped ones with sloping sides. Stock should be kept out where possible. Kikuyu grass and the weeping willow tree will be of value where there is summer moisture. *Paspalum vaginatum** is very promising for summer moist salt land gullies. Various native plants and weeds are also likely to be of use, and where plants have already started to grow in gullies, it is worth gathering seed and spreading by hand or transplanting. Local tea trees, rushes, and sedges are helping to prevent gully enlargement in some places.

The head of the gully needs attention first and should be sloped off to 1 in 5 or less, and seeded thickly. Bags of soil, wire and brush fences, mounds of soil seeded thickly, straw, stone or roots may then be used to block the gully lower down. Such obstacles to the flow of water are best kept quite low, about one foot high, and placed at close intervals down the gully. If successful and they silt up, the process can be repeated. It is a bad mistake to make obstacles too high as water will cut around or under them, or the overflow will cut big holes and destroy the work done.

Roads Can Cause Gullies.—Roads both inside and outside farms are good watersheds and unless run-off is diverted from table drains at close intervals, say every two to three chains, the concentrated run-off often starts gullies. (See Fig. 12.)

Fig. 12.—Gully formed by runoff from road in the Northam district. When water which runs off roads is not diverted frequently from table drains, it gains enough volume and speed to scour gullies. Photo.—Govt. Printer.

* Small quantities of roots are available from the Department of Agriculture.

Road boards are usually eager to co-operate when this is pointed out to them. It is also in the farmer's interest to see that his own farming methods do not cause damage to roads.

SPECIFICATIONS FOR CONTOUR BANKS.

A. *The Absorption Type of Contour Bank* is for use on gentler slopes of up to three per cent. except in some special circumstances. Absorption banks are built level on a true contour and are designed to hold run-off water on the land till absorbed by the soil. They are not expected to be used much in the 15 to 25 inch rainfall areas.

B. *The Drainage Type of Contour Bank* is for leading run-off water safely from sloping lands. Drainage banks will probably be needed on most cultivated slopes of five per cent. to 10 per cent. in the 15 to 25 inch rainfall areas. Systems of contour banks of this type must have a suitable waterway into which the water they carry may be discharged and led safely into creeks or rivers. (See Fig. 9.)

Length of Banks.—The channel should not usually carry water in one direction for more than 1,600 to 1,800 feet (24 to 27 chains). By grading to run both ways from a suitable point the distance between waterways can be doubled safely.

Spacing.—Contour banks should be close enough to catch run-off from the area between banks before it gains volume and speed which could cause erosion.

For trial purposes, a vertical interval of ten feet has been used on demonstration experiments in progress. This means that each bank is ten feet lower than the bank above it, so that on a ten per cent. slope banks would be 100 feet (1½ chains) apart and on a five per cent. slope they would be 200 feet (three chains) apart. A few banks at 15 feet and 20 feet vertical intervals are also under trial.

For general purposes, spacing at a vertical interval of ten feet is recommended in the 15 to 25 inch rainfall zone. This means spacing of one and a half to two chains (100 to 130 feet, on steeper slopes of seven to ten per cent., and three to four chains (200-270 feet) on slopes of four to six per cent.

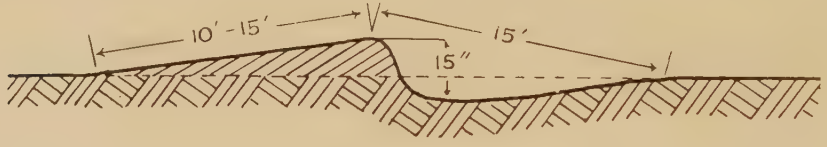
In practice, it is often necessary to vary the vertical interval up or down to avoid obstacles. Generally it is better to make the interval smaller. This applies especially to the interval from the top of the hill or drainage divide, to the top bank. If the top bank does not hold, the lower ones will almost certainly fail. Where banks cannot start at the hill top, an adequate diversion drain is needed above them.

Grades.—It is generally accepted that channel grades of more than four inches per 100 feet (0.3 per cent.) are seldom necessary or advisable. A variable grade increasing towards the outlet is commonly used. For example, a bank 1,600 feet long may be given a grade of one inch per 100 feet from the start to 400 feet, two inches per 100 feet from 400 to 800 feet, three inches per 100 feet from 800 to 1,200 feet and four inches per 100 feet from 1,200 to 1,600 feet at the outlet end: A total fall of three feet four inches in 1,600 feet.

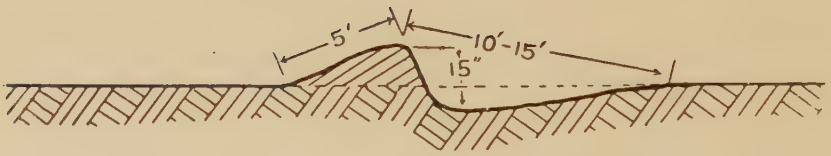
But grades like one inch in 100 *feet are suitable only for very even smooth slopes.*—On ground which is less smooth and even, the grade is better started at say two and a half inches per 100 feet (0.2 per cent.) and increased every 300 to 500 feet. In Western Australia, grades up to six inches per 100 feet (0.5 per cent.) have been used and are likely to be safe if the channel is kept well covered with grass and clover.

Where eroded areas are crossed, it is advisable for the grade to be say three inches per 100 feet (0.25 per cent.) or higher. Grades up to 18 inches per 100 feet (1.5 per cent.), have been used for experimental purposes, but are not generally recommended as they are likely to scour into gullies.

Size and Shape.—The bank should rise 15 to 18 inches above the bottom of the water channel which should be two to four feet wide on the bottom and six to 12 feet wide on top.



A



B

Fig. 13, A & B: Cross sections of contour banks recommended in W.A. (B) and S.A. (A).
B. shows a cross section of the type of bank recommended for W.A.
A.: Cross section of bank recommended in South Australia.

The type of bank recommended in Western Australia is shown in Fig. 13 B. and Fig. 15. This shape gives big water channel capacity and low construction cost. Disadvantages are:—

(i) Cannot be cultivated and may thus harbour weeds.

(ii) Cannot be seeded and out of every 100 acres on 5% to 10% slopes, three to seven acres would be lost for cropping. With a three to six year rotation on relatively low priced land, this does not appear serious.

(iii) Cannot be crossed by machinery or transport.

In Fig. 13A, the type recommended in South Australia is shown. The whole lower side of the bank can be seeded if made as wide as the combine in use on the farm.

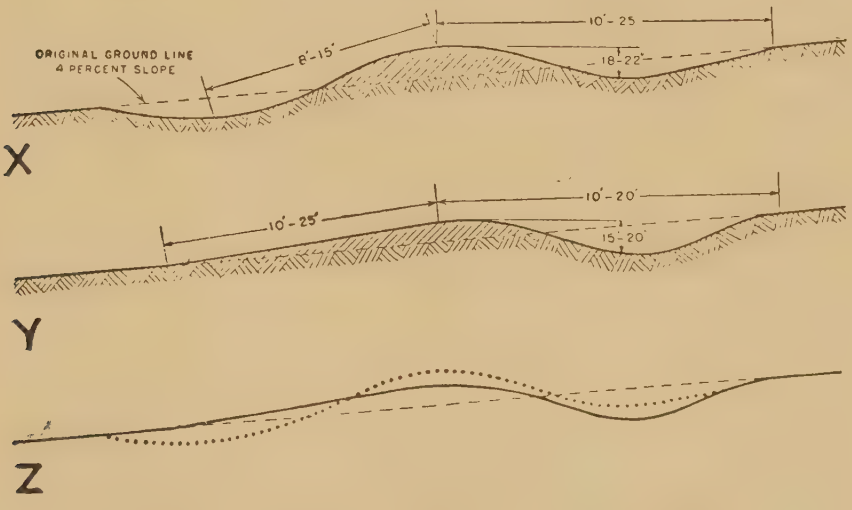


Fig. 14.—Sections of contour banks recommended in New South Wales and the United States of America. X shows the section of a bank built from both sides; Y when built entirely from the upper side and Z gives a comparison of banks built by the two methods.

Diagrams from U.S.D.A. Farmers' Bulletin, 1789, 1943.

The broad based type of contour bank (called terrace in U.S.A.) recommended in New South Wales and the United States of America can be cultivated and cropped without any loss of area. But the cost of construction is higher (See Fig. 14.)

Fig. 15.—Contour bank in the Northam district on land sloping down from right to left. The upper tape is parallel to the ground and the lower tape is horizontal, showing a fall of about one foot in 25 feet, that is a four per cent. slope. The ridge of the bank is about 13 or 14 inches above the bottom of the water channel on the right. The ridge is not quite high enough and the channel should be wider.

Photo—Govt. Printer.

Machinery and Equipment.—Heavy disc and mouldboard ploughs, twin disc cultivator ploughs, grader-ditchers, and road graders, have all been used for bank building in Western Australia. Ploughs are more suitable for slopes up to 4%, and moist soil, but can be used on steeper slopes. Grader type equipment can be used to build banks entirely from the upper side on steep slopes. See Fig. 16. This is better and cheaper. Graders also work well with dry soil providing it does not powder. Smaller equipment of these types is readily available and suited to farm tractors. Scoops or grader-ditchers are needed to fill gullies where banks are to cross, before the bank is built. It has not yet been possible to test heavy modern earth moving machinery for contour bank building in Western Australia.

Fig. 16.—The grader-ditcher is useful for building contour banks. It is also valuable for pasture furrowing on slopes up to 15 per cent. This machine has a seven foot blade which is readily reversed to build contour banks entirely from above on steeper slopes.
Photo—Govt. Printer.

Waterways for Contour Bank Outlets.—Any area of land would be served by a group of banks. Such groups or systems of banks need one or more outlets which will serve to carry excess water safely to drainage lines or absorption areas. A strip of land about two chains wide and nearly level across, with the gentlest available slope downhill, is desirable, and may be safely used if well grassed. The waterways should be selected and, if possible, heavily seeded to pasture and well fertilised one or two years before contour banks are built. Suitable valleys with good natural grass are sometimes available. But in the areas where waterways are most needed, such sites are often already gullied and therefore unsuitable. (See Fig. 9.)

Construction of Contour Banks.—The top bank is built first and then succeeding ones downhill. If this were not done, lower banks built first are likely to fail in a storm during construction.

Cost of Contour Banks.—The cost of contour bank work varies greatly. The number and size of gullies to be crossed and reclaimed, the skill of the operator, the kind of country and the condition of the soil are the most important factors. Figures kept in Western Australia suggest that most contour bank work is likely to cost from 5s. to 15s. an acre.

HOW EFFICIENT ARE CONTOUR BANKS?

Contour banks can be almost 100 per cent. efficient in preventing water erosion. But they cannot do the job alone. If used on suitable areas and supported by land use adapted to the needs of each area, results will be very satisfactory. But if maintenance or any of the supporting practices are neglected, contour banks are likely to fail.

CONTOUR BANKS MUST BE SUPPORTED BY SUITABLE ADJUSTMENTS IN FARMING PRACTICE.

Storms.—Contour banks should not be expected to give protection against all storms. They could do this if made big enough and close enough together. But as this may mean construction and working costs out of proportion to the value of the land, it seems reasonable to take some risks and expect that at intervals damage to bank systems will occur from particularly severe rainstorms.

Flood Control and Soil Conservation.—Flooding results when too much water runs off high land too quickly for safe discharge by natural drainage channels.

The practices discussed for the prevention and control of soil erosion by water also lessen the danger of flooding. They have two main purposes, firstly, to absorb and use rain where it falls; secondly, when this is not possible, to slow down run-off and stop erosion. When appropriate soil conserving practices have been applied to the main parts of any single watershed, flood hazards due to that watershed will be greatly decreased.

CONTOUR BANKS IN W.A.

With contour banks, experience in Western Australia dates from 1941 so far as is known. It emphasises nine points, which are:—

1. The lines must be laid out with a level.
2. Contour banks put in by eye have failed in two known cases.
3. A carpenter's level used with an "A" frame as described in the Journal of the Department of Agriculture, W.A., September, 1938, will do the job satisfactorily. (See also Figs. 17 & 18.)
4. Satisfactory contour banks can be made with farm tractors and ploughs, grader-ditchers and road graders.
5. Working contour banked paddocks is not as awkward as expected.
6. The cost of contour banking is likely to vary from 5s. to 15s. per acre in most cases.
7. The results have more than justified the expense.
8. Farmers who have already used contour banks want more of them.
9. In the Northam district, one farmer seeing contour banks on a neighbouring farm, made an A frame level and has already designed, levelled and built, banks on five of his paddocks with horses and plough.

THE A FRAME LEVEL.

The pegging of lines for contour working and particularly for drainage type contour banks with varied grades, requires a suitable levelling instrument. If a surveyor's level is not available, the A frame can be made and will enable a carpenter's level to do the job. The A frame can be made of very light materials if suitably braced.

The following diagrams and description of the A frame are taken from the booklet "Soil Erosion and Its Control" published by the Rural Bank of New South Wales. (See Figs. 17 & 18.)

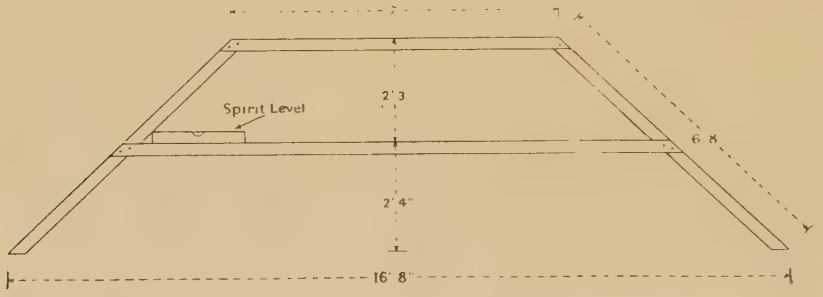
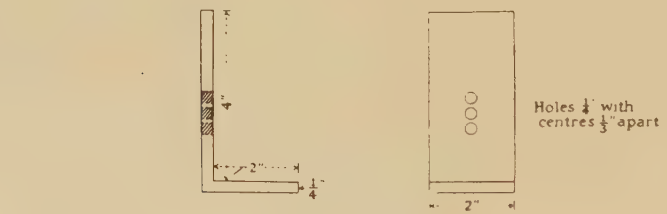
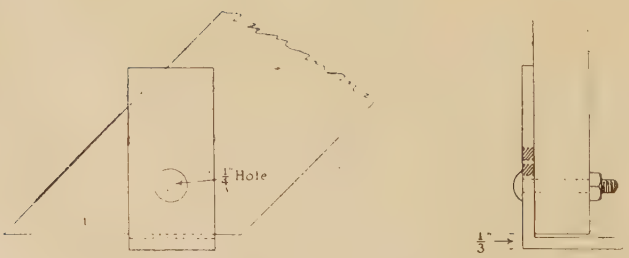


Fig. 17.—The A Frame Level.
The carpenter's level is commonly used in the middle of the frame.



Adjustable Foot



Adjustable Foot bolted to leg

Fig. 18.
Detail of A frame.

In construction, care must be taken to ensure that the spread of the legs is 16ft. 8in. (200in.) and the centre crosspiece is perfectly level when the legs are of equal length and the frame stood on a level floor.

This frame can be used for marking out level banks without any adjustment. For marking out variable graded banks an adjustable foot is attached to one leg so that it can be lengthened by $\frac{1}{3}$in. at a time ($\frac{1}{3}$in. in 200in. = 2in. in 100ft.) so that grades can be fixed to 2in., 4in. and 6in. per 100ft.

A $\frac{1}{4}$in. hole is bored in one leg about 1in. from the foot, a piece of 2in. x $\frac{1}{4}$in. iron is bent to form an L. The first hole is drilled in it to correspond with the hole in the leg when the base of the L is $\frac{1}{3}$in. below the leg. Other holes are drilled $\frac{1}{3}$in. apart along it.

Where 2in. fall in 100ft. is required the foot is clamped to the leg with a $\frac{1}{4}$in. bolt through the lowest hole, for 4in. fall in 100ft. through the second hole, and so on. (See Fig. 18.)

It should be tested before use and periodically while levelling.

To test the "level," set it up on a floor or smooth piece of ground so that the bubble of the spirit level is in the centre and mark the position of the lower ends of the legs. Then reverse the "level," end for end, placing the legs on the same spots. If the apparatus is in adjustment the bubble will still be in the centre.

NEW PUBLICATION: AUSTRALIAN JOURNAL OF SCIENTIFIC RESEARCH.

The Council for Scientific and Industrial Research, in collaboration with the Australian National Research Council, has established in Australia a new scientific journal, the "Australian Journal of Scientific Research," as a medium for the publication of research papers of outstanding merit. This journal is open to receive contributions from research workers, irrespective of country or of the organization to which they are attached.

Dr. N. S. Noble has been appointed as Editor of the new journal. Editorial policy is determined by an Editorial Board under the chairmanship of the Editor and comprising as members: Professor W. J. Dakin (Department of Zoology, University of Sydney), Professor E. J. Hartung (Department of Chemistry, University of Melbourne), Professor L. H. Martin (Department of Physics, University of Melbourne), and Professor J. G. Wood (Department of Botany, University of Adelaide). In order to maintain the journal at a high standard a strict refereeing system has been instituted.

The journal is printed in two series: Series A (Physical Sciences) and Series B (Biological Sciences). Each series is issued quarterly, the subscription being 30s. per annum. The first two numbers of each series have been issued, and inquiries and orders for the new journal should be addressed to the Secretary, C.S.I.R., 314 Albert Street, East Melbourne.

MOLYBDENUM FOR THE PREVENTION OF "WHIPTAIL" IN CAULIFLOWERS.

By T. C. Dunne and L. T. Jones, Plant Nutrition Branch.

The disorder of cauliflowers known as "whiptail" has been known for many years in Western Australia and, at times, has been particularly serious in some of the market gardens near Perth.

"Whiptail" plants are always stunted and are characterised by pale, distorted, ruffled leaves associated with a narrowing of the leaf blades (Fig. 1). All affected plants produce inferior grade flowers which may be small, open and unmarketable, even when the disease is only moderately severe.

The more severely affected "whiptail" plants become very badly stunted. The centre leaves fail to develop leaving only a button from which there is no further growth. Plants affected in this manner often develop adventitious shoots from those portions of the stems below ground level. (Fig. 2.)

In past years applications of lime have been recommended as a corrective for "whiptail." It has recently been suggested that lime, so used, is effective by virtue of its action in overcoming soil acidity, thereby increasing the availability of molybdenum which is known to be relatively insoluble under acid conditions. In this State, however, the disease is not confined to acid soils and heavy dressings of stable manure or organic wastes (20-40 tons per acre) sometimes have given better control. It is possible that the molybdenum contained in such added material suffices for the needs of a cauliflower crop.

Fig. 1.
A typical "Whiptail" plant.

Fig. 2.
A severely affected plant showing adventitious shoots from below ground level.

DISTRIBUTION AND OCCURRENCE.

"Whiptail" of cauliflowers is generally regarded as being a disease of acid soils but in Western Australia it has regularly been observed on soils which are alkaline. It can occur, for example, on the orange coloured tuart sands which have pH values ranging to 8.2 and on the calcareous loams at Coogee which contain as much as 70% calcium carbonate and have pH values ranging to 8.6.

It is true, however, that severe losses have been experienced on peaty swamp soils (pH 4.2-5.8) on sections of which attempts to raise cauliflowers have been abandoned. Here, however, the losses may have been accentuated by the fact that these areas did not receive the heavy dressings of stable manure (up to 20 tons per acre) which are usually applied to the neighbouring sands and which, as mentioned above, may provide reasonable amounts of molybdenum.

In addition to occurring on the above soils, severe "whiptail" has also been noted on the gravely loams of the Darling Range and on the loamy sands of the Mooliabeenie area. Here again, it may be significant that dressings of stable manure are not normally used.

Disease symptoms may become apparent when the plants are in the six to eight leaf stage and there is evidence that it is accentuated by dry soil conditions. Early sown affected plants which are, because of insufficient moisture, making slow growth, may develop normal leaves after the advent of good rains and eventually produce marketable flowers.

There is a difference in varietal susceptibility. The quick growing, early maturing varieties are usually most severely affected but on certain soils some of the later varieties are equally unsatisfactory.

MOLYBDENUM AS A FACTOR.

In 1945 Mitchell (3) in New Zealand reported success in controlling "whiptail" by the use of a molybdenum containing compound (ammonium molybdate). Rates of 1lb., 5lb., and 20lb. per acre were applied along the lines of planting a week before the plants were set out. Symptoms failed to appear, though growth was not vigorous, with the application of 1lb. per acre and virtual control of the disease was effected with a dressing of 5lb. per acre. On the other hand, heavy dressings of lime applied just prior to planting were of no benefit.

Since that time it has been shown in New South Wales (4) that "whiptail" was almost completely controlled by dressings of 1lb. per acre of sodium molybdate but that an application of ¼lb. per acre was insufficient.

Carefully controlled work by Hewitt and Jones (1) has demonstrated that "whiptail" of cauliflowers can be developed by withholding molybdenum from the nutrients supplied to plants and that only extremely small quantities of that element are necessary for normal growth.

A review of the literature shows, therefore, the definite relationship of molybdenum to the disorder. Further, it can be safely concluded that the occurrence in cauliflower of "whiptail" symptoms is due to an insufficient supply of molybdenum for normal plant growth.

EXPERIMENTS IN WESTERN AUSTRALIA.

Osborne Park Area.

Friable peaty soil—pH 4.6-pH 5.0.

In 1945 Jones (2) observed that "whiptail" symptoms did not develop on plants receiving a fertiliser mixture containing magnesium, manganese, copper, zinc, boron and molybdenum (as molybdenum trioxide at 1lb. per acre) whereas many affected plants occurred in nearby plots not receiving that mixture. No further attempt was made to determine the element or elements responsible for the effect.

In February, 1948, following on the successful New Zealand work, an attempt was made to determine the value of molybdenum for "whiptail" control on the same soil type. For this purpose the following treatments were used:—

A—Control.

B—Sodium molybdate, pure—2lb. per acre.

C—Molybdenum trioxide (roasted molybdenite)—2lb. per acre.

D—Slaked lime—1 ton per acre.

The molybdenum content of the sodium molybdate was about 40% and of the molybdenum trioxide was about 55%.

The materials for the treatments were mixed with a fertiliser mixture containing superphosphate, sulphate of ammonia and potash, which was used at the rate of about 15cwt. per acre. The mixtures were placed near the planting holes when the plants were set on March 2nd. There were four plots of each treatment, each plot consisting of 16 plants.

Unfortunately autumn rains were very late, and although some soil moisture was available, the plants developed very irregularly. By the time sufficient rain fell for normal growth, the growth of the plants within each plot was very variable and these initial differences persisted. It was therefore impossible to make an accurate analysis at harvesting which took place over an extended period.

It was noted, however, that irrespective of treatment, all plants developed "whiptail" in the early stages. This condition persisted until most of the plants were over one foot tall when there were indications on new leaves that the molybdenum might be having a beneficial effect.

Three months after planting, however, it was apparent that the new growth of the plants which received molybdenum was smooth, healthy and of normal appearance. These plants continued to improve and a satisfactory crop was obtained.

The final inspection showed that both sodium molybdate and molybdenum trioxide had been eventually completely effective in eliminating "whiptail" symptoms from the later growth. Except for one small corner of the area, the control plants were all severely affected. Lime had no beneficial effect.

Typical plants from this area are shown in Figures 3 and 4.

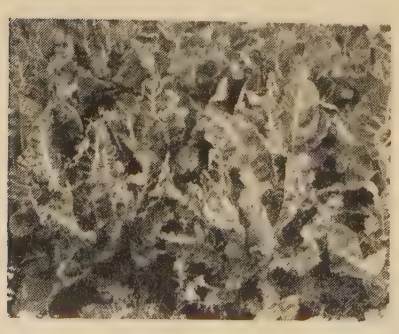


Fig. 3.
Plants without molybdenum.

Fig. 4.
Plants which received sodium molybdate.

Mooliabeenie Area.

In June, 1948, an area was inspected at Mooliabeenie where a large number of cauliflowers were severly affected with "whiptail." Seasonal conditions had been dry until a few weeks prior to the inspection.

Plantings had been made over a period of time so that various blocks were in different growth stages. An investigation was therefore begun to determine—

(a) the minimum quantity of molybdenum for field use.

(b) the most forward growth stage at which molybdenum could be used to ensure recovery of affected plants.

For the experiments a commercial line of sodium molybdate was used. This material contained only about 45% sodium molybdate, the remainder being mainly sodium nitrate. The treatments used were:—

	Commercial sodium molybdate gms. per plant	=	approx. lb. per acre.
A	Nil		Nil
B	0.2		2
C	0.4		4
D	0.8		8
E	1.6		16

The molybdenum was used mixed with a superphosphate dressing of approximately 100lb. per acre. It was applied near the bases of the plants in holes which were filled in after the application of the manure. The control plants received only superphospate at this time. All treatments were carried out on June 30.

Site 1.

Plants at 12-16 leaf stage and 1-2ft. tall. They had been transplanted on March 9.

Soil—very gravelly loamy sand—pH 57—pH 6.2

The plants in this group were showing severe "whiptail" symptoms. Each treatment was applied to one row in which were about forty plants.

With the advent of increased soil moisture, some improvement occurred with all plants but there was no diminution of the severity of the symptoms with any treatment.

It appears that at the stage of growth at which molybdenum was applied to these plants, it is too late to bring about commercial recovery.

Site 2.

Plants at 6-8 leaf stage and about 8in. tall. They had been transplanted about mid-May.

Soil—sandy loam and gravelly sandy loam—pH. 5.0—pH 6.1.

Two rows each of about forty plants were used for each treatment.

Growth of all plants had ceased about two weeks prior to the application of the treatments and a number of the plants were showing "whiptail" symptoms.

Careful inspection a month later indicated that new growth was occurring at the centres of the plants receiving molybdenum but this was not the case with the control plants. Three weeks later, i.e., seven weeks after treatment, the differences in growth due to the use of molybdenum were obvious.

A final survey of the experiment was made in early October, at harvesting time. The following data were obtained on the incidence of "whiptail" and on the quality of the flowers produced.

Treatment.	Commercial Sodium Molybdate Rate per Acre.	Per cent. "whiptail" Plants.	Per cent. Marketable Flowers.		
			Grade 1.	Grade 2.	Grade 3.
A	*Nil*	97	*Nil*	*Nil*	2
B	2 lb.	1.0	63	10	14
C	4 lb.	*Nil*	53	15	13
D	8 lb.	*Nil*	60	14	12
E	16 lb.	*Nil*	57	13	21

The results show that sodium molybdate, as used in this experiment, on plants at the 6-8 leaf stage, was successful in controlling "whiptail" and in producing a marketable crop. It was also shown that the use of higher rates than 2lb. per acre of commercial sodium molybdate was not necessary. There was no evidence of injury at the higher rates used.

Figure 5 shows typical plants of adjoining rows in the experiment.

Fig. 5.
Plant on left—Commercial Sodium Molybdate 0.4 gm.=4lb./acre.
Centre plant—Commercial Sodium Molybdate nil.
Plant on right—Commercial Sodium Molybdate 1.6 gm.=16 lb./acre.

Site 3.

Plants at 4-6 leaf stage and 6in. tall. Transplanting had been done on June 8.

Soil—loamy sand—pH. 5.5—pH 5.7.

The plants of this group were, at the time of application of the mixtures, just beginning growth. The treatments were each applied to two rows, each of about twenty-five plants.

On this area severe whiptail occurred only on one end of the rows where the soil included more gravel. However, as with the previously reported trial, the first signs of benefit from molybdenum were noted about a month after treatment and these effects were quite obvious a month later.

Before the flowers were mature the plants began to suffer from drought so that maximum growth was not attained. The following data were obtained from a survey made on October 29:—

Treatment.	Commercial Sodium Molybdate Rate per Acre.	Per cent. "whiptail" Plants.	Per cent Marketable Flowers.		
			Grade 1.	Grade 2.	Grade 3.
A	*Nil.*	33	2	11	43
B	2 lb.	*Nil.*	10	32	30
C	4 lb.	*Nil.*	6	40	32
D	8 lb.	*Nil.*	12	46	23
E	16 lb.	*Nil.*	10	47	22

The results again show the effect of the sodium molybdate in eliminating "whiptail" and in improving the commercial value of the crop.

General Field Results.

Because of the widespread nature of the disease of this Mooliabeenie property, the owner was supplied with sufficient crude sodium molybdate to treat the plants not included in the experiments reported above. An arrangement was made whereby every twentieth row was not to receive the molybdate.

In accordance with this arrangement, commercial sodium molybdate was applied with sulphate of ammonia, the mixture being placed in holes near the plants. More than 10,000 plants were treated.

The results were in keeping with those obtained experimentally, the younger plants treated developing free from abnormality whereas the control rows showed 90 to 100 per cent. "whiptail" with few marketable flowers.

RECOMMENDATIONS.

For the control of "whiptail" in cauliflowers it is therefore recommended that growers use molybdenum, which is obviously essential to healthy growth.

Molybdenum can be obtained in a readily soluble form as commercial sodium molybdate which contains about 45 per cent. actual sodium molybdate. This should be applied at the rate of 2lb. per acre mixed with the usual fertiliser dressing. Application should be made close to the plants at the time of planting or shortly thereafter.

Molybdenum trioxide (roasted molybdenite), which is less soluble, has also proved effective on very acid soil but has not been yet tested as extensively as sodium molybdate.

Although lime was not used in sufficient quantity to neutralise all acidity in the Osborne Park peaty soil, the method of placement should have created a limited area of alkalinity. In spite of this, insufficient molybdenum became available to benefit the plants. It is therefore recommended that attempts to control the disease by liming be discontinued in favour of manuring with sodium molybdate.

ACKNOWLEDGMENT.

Mr. A. Guelfi of Osborne Park and Messrs. R. Kukura and L. O. C. Thompson, of Mooliabeenie are thanked for their help in obtaining the data reported above.

SUMMARY.

"Whiptail" of cauliflowers occurs in Western Australia on a variety of soil types. It has been observed regularly on both acid and alkaline soils.

It has been shown elsewhere that the disorder results from a deficiency of molybdenum and that it can be prevented by manuring with molybdenum compounds.

Local experiments show that commercial control can be achieved by the use of molybdenum in various forms. It is also shown that "whiptail" plants up to the 6-8 leaf stage can develop normally following manuring with a commercial sodium molybdate. Success in curing affected plants in a more advanced growth stage is doubtful.

Lime used at the rate of one ton per acre placed near the plants did not control the disease on a very acid soil.

Recommendation is made that for control of "whiptail" use be made of a commercial sodium molybdate, containing about 45% of the effective salt, for application at the rate of 2lb. per acre.

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UREA FEEDING TRIAL—DENMARK, 1947.

By V. Weston, Manager, Denmark Research Station.

A recent innovation in the field of animal nutrition is the use of urea as a substitute for a part of the protein needs of the animal. In America during the war it was extensively used in concentrate mixtures to supply portion of the protein requirements of dairy cows.

Urea is a white crystalline synthetic compound which looks very much like salt, and tastes a little like epsom salts. It contains approximately 42 per cent. nitrogen and, therefore, has a protein equivalent of 262 per cent. It thus has nearly seven times as much nitrogen or protein equivalent as soybean meal, or over ten times as much as linseed meal, containing 25 per cent. protein equivalent.

However, unlike the oil meals or other protein concentrates urea does not contain any carbohydrates, fats or minerals. Therefore, it needs to be "built up" in this respect by mixing it with grains like wheat and oats to give a mixture comparable with linseed meal. For example 34 lb. of linseed meal is equivalent to 3 lb. of urea plus 31 lb. of oats.

Experimental results overseas show that urea is safe and efficient as a protein substitute when it supplies approximately one-third of the total crude protein in the concentration ration fed to the ruminant, but if fed in high concentrations can be toxic.

Urea cannot be used satisfactorily with non-ruminants.

The following urea feeding trial at Denmark Research Station was designed to—

(a) Compare the results obtained from feeding the farm concentrate ration (ration A) with results from the same ration to which up to three per cent. of urea had been added (ration B). Ration A contained less than the optimum amount of protein, due to shortage of protein meals.

(b) Compare the results obtained from feeding ration B and a third ration in which the linseed meal or a linseed meal concentrate had been incorporated to supply an adequate level of protein

The experiment covered a period of four months.

Three groups of three cows were selected from the herd. Selection was based on past available butter fat records, age and number of previous calvings. Groups were made as even as possible to enable a reasonable comparison of average results.

One group of cows was used as a control group—and fed on ration (A) for the entire period. The other two groups were fed alternately on the urea ration (B) and the linseed ration (C) for monthly periods.

Denoting the three groups of cows as group 1, group 2 and group 3, respectively, this may be shown as follows:—

1st Month	1 A	2 B	3 C
2nd Month	1 A	2 C	3 B
3rd Month	1 A	2 B	3 C
4th Month	1 A	2 C	3 B

The milk from each of the nine cows was weighed and recorded night and morning.

Butter fat tests were carried out at monthly intervals.

Details of the rations are as follow—

RATION A:

50 lb. crushed wheat	4.35 lb. protein
40 lb. crushed oats	3.34 lb. protein
10 lb. linseed meal (25%P)	2.50 lb. protein
	10.19 lb. protein

RATION B:

50 lb. crushed wheat	4.35 lb. protein
40 lb. crushed oats	3.34 lb. protein
7 lb. linseed meal	1.75 lb. protein
3 lb. urea	7.86 lb. protein
	17.30 lb. protein

RATION C:

25 lb. crushed wheat	2.175 lb. protein
25 lb. crushed oats	2.085 lb. protein
50 lb. linseed meal (25%P)	12.500 lb. protein
	16.760 lb. protein

Unfortunately it was not possible to have analyses made of the mixtures and the protein values had to be calculated from standard tables.

Three and a half lb. of the above mixtures were fed per gallon of milk produced daily. The quantity was adjusted monthly.

The maintenance ration was uniform for the whole herd and consisted of:—

Prior to March 21, 1947	Dry pasture feed and 8 to 10 lb. long green maize daily per cow.
To April 21, .. 1947	Dry pasture—sparse. 8 to 10 lb. of long green maize daily.
To May 21, .. 1947	No maize, but short green pasture, clover and rye grass.
To June 21, .. 1947	Short green pasture—clover and rye grass 4 to 5 lb. meadow hay.
To July 31, .. 1947	Short green pasture—clover rye grass and 4 to 5 lb. meadow hay.

The table shows the total and average milk and butter fat production for the three ration groups.

Observations.

Some cows did not like the flavour of the urea, and in consequence would not eat the mixture at first. For these the quantity was reduced and later gradually increased.

The urea caused scouring for some days amongst most of the cows until the system became adjusted.

Some were not upset in any visible way. Others appeared to relish the mixture and always looked for more, although at times affected by scouring or indigestion.

General impression was that three per cent. urea in the concentrate mixture was too strong.

Feed changes were too sudden from one ration to the other, often contributing to indigestion. There was no visible loss or gain of weight or condition on any ration.

All cows were otherwise healthy except for the control group during the last 14 days.

Discussion.

From the tables it will be noticed that the control group fed ration A (low protein content) maintained a very even production throughout.

Extreme fluctuations are absent. Sickness during the last 14 days caused a fall in production and slightly greater daily variations.

The B and C ration groups show a greater tendency toward daily variations in production.

Ration C gave slightly higher production.

Table of total and average production of three groups:—

	Total Milk	Average Milk Per Day	Butterfat Average Per Day	Butterfat Total
	lb.	lb.	lb.	lb.
Ration A	6,460	52.5	3.39	417.16
Ration B	6,466	52.2	3.44	423.29
Ration C	6,715	54.5	3.72	458.18

There is little or no difference between rations A and B. The indication is that the urea gave no increased production.

Ration C containing the extra linseed protein gave an increase of 3.9 per cent. of milk and an increase in butterfat of 9.8 per cent. over ration A and 8.2 per cent. over ration B.

Ration	A.			B.						C.					
Name of Cow	Denmark Golden Dawn.	Denmark Velveteen.	Denmark Rosemary II.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.
Date.															
March 21	21	15	14	26	18	17½	....	....	....	....	....	....	22	29½	13½
March 22	22½	15	14½	22½	19½	16½	....	....	....	....	....	....	22½	27	14½
March 23	20½	18	16	23	18½	16	....	....	....	....	....	....	20	25½	11½
March 24	19	18½	13½	23	16	17½	....	....	....	....	....	....	19	26	13½
March 25	20	18½	15	25½	16	16	....	....	....	....	....	....	22	26	12½
March 26	21	17½	12½	23	17	16	....	....	....	....	....	....	22	29	15
March 27	19	23	12½	19	17½	17	....	....	....	....	....	....	21	27½	14
March 28	21	23½	13	25½	19	17	....	....	....	....	....	....	25	26½	16
March 29	20	26½	10	23	18	15½	....	....	....	....	....	....	23½	28½	15
March 30	21½	24½	12	21½	18	16	....	....	....	....	....	....	23½	27	14
March 31	19	26½	12½	21½	15½	15	....	....	....	....	....	....	24	27	13½
April 1	19	24	11	23½	17	17½	....	....	....	....	....	....	23	26	14
April 2	19	23½	12½	16½	21	16	....	....	....	....	....	....	23½	29	15
April 3	19½	24	12½	19½	17	14½	....	....	....	....	....	....	23	20	13
April 4	20	25	13½	21	16½	16	....	....	....	....	....	....	23	28	14
April 5	18½	24	9½	16	16	15	....	....	....	....	....	....	24	27	11
April 6	17	22	13	21½	20	14½	....	....	....	....	....	....	24	25	18
April 7	17	19	13	19	16	14	....	....	....	....	....	....	13½	21	10
April 8	18½	21	14	19	15	14½	....	....	....	....	....	....	18	22	10
April 9	18	24½	14	19½	16	15½	....	....	....	....	....	....	20	24	13
April 10	18	25	15	19	14½	15	....	....	....	....	....	....	20½	23	12
April 11	17	23	12	20	17	14½	....	....	....	....	....	....	20½	24	10
April 12	19	23½	15	19	16½	15½	....	....	....	....	....	....	21½	26	8
April 13	19	25	13	16½	14	14	....	....	....	....	....	....	20½	27½	14
April 14	19	25	14	22	18	14	....	....	....	....	....	....	19	26½	5½
April 15	19½	24½	13	20	18	17	....	....	....	....	....	....	24	26	12½
April 16	19½	24	12½	24	17	18½	....	....	....	....	....	....	22	26½	12
April 17	19	24	16	22	17½	14½	....	....	....	....	....	....	21½	26½	12
April 18	19	25	16½	20	17½	18	....	....	....	....	....	....	24	25	13
April 19	18	25	14½	23	18½	19	....	....	....	....	....	....	23	25½	15
April 20	18½	24	15½	22	18½	18	....	....	....	....	....	....	21½	25	13
April 21	18	24	15½	25	18½	19	....	....	....	....	....	....	23	28	15
Morning Weight	11	15	9	14½	11	10	....	....	....	....	....	....	16	17	7
	6.5	6.0	5.5	5.6	4.8	4.9	....	....	....	....	....	....	4.8	4.8	4.0
Evening %	8	9	7	11	8	9½	....	....	....	....	....	....	8	12	6
	6·4	7·2	7·8	6.1	7.2	8.2	....	....	....	....	....	....	5.8	6.7	5.8
Butter Fat %	1.227	1.548	1.041	1.482	1.104	1.269	....	....	....	....	....	....	1.216	1.620	.628

Ration	A.			B.						C.					
Name of Cow	Denmark Golden Dawn.	Denmark Velveteen.	Denmark Rosemary II.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.
Date.															
April 22	20	21½	15½	....	....	....	21	28	13	23	19	17½	..	..	..
April 23	18	23½	15	....	....	....	22	27	13½	22½	20	18½	.	..	..
April 24	19½	23	14	....	....	....	21	28	14	24	20½	17	....	. .	....
April 25	21	22½	15½	....	....	....	19	26	13	21	21	16	....	. .	..
April 26	19	24	12	....	....	....	21	23	12½	24	22	19½	....	....	....
April 27	19	23	16	....	....	....	20	25½	12½	24	21	17	....	....	....
April 28	20	25½	15	....	....	....	19½	27½	13½	24	21	15	....	....	....
April 29	19	25½	15	....	....	....	19	27	14½	23½	21	18	....	....	....
April 30	18	23½	16	....	....	....	19	27½	13	24	21	18½	....	....	....
May 1	19	23	14½	....	....	....	20	27	15	23	22	16½	....	....	....
May 2	18½	24½	17	....	....	....	20	25½	14	25	21	19	....	....	....
May 3	19	20½	15	....	....	....	23	23	14	23½	22	18½	....	....	....
May 4	19	23	16	....	....	....	21	26	15	20	21	16	....	....	....
May 5	18	22	14½	....	....	....	20	26½	14	26	18	12	....	....	....
May 6	17½	22	12	....	....	....	18½	26	14	14	20½	18	....	....	....
May 7	18	22	14	....	....	....	14½	25	15	21	18	15	....	....	....
May 8	17	22½	13	....	....	....	17	25½	13½	17	15	16	....	....	....
May 9	17	21½	12½	....	....	....	17	24	14	20½	21½	16½	....	....	....
May 10	17	19½	13½	....	....	....	18	25	13	19½	17	15	....	....	....
May 11	18	23	13	....	....	....	19½	28½	15	19	17	18	....	....	....
May 12	16½	22½	14	....	....	....	19	25	11	22	19	17	....	....	....
May 13	17½	23½	14½	....	....	....	17	27	14	20½	20	18	....	....	....
May 14	17½	26	14	....	....	....	16	25½	13	21½	22	17	....	....	....
May 15	17	23	14	....	....	....	17	24	13	20½	20	20	....	..	....
May 16	17½	23½	14	....	....	....	16½	23	13	20½	20½	18	....	..	....
May 17	19½	24	14	....	....	....	17	22	14	20	19	18	....	....	....
May 18	17½	24½	14	....	....	....	23	18	12½	21	19	20	....	....	....
May 19	15	23	15	....	....	....	22	13½	13	23	17	14	....	....	....
May 20	19½	25	14½	....	....	....	18	15	13	19	23	22½	....	....	....
May 21	18	23	13½	....	....	....	16	12	14	22	20½	17	....	....	....
May 22	18½	26	14½	....	....	....	18	9	13	21	20	20	....	..	....
Morning } Weight	9½	14	8	....	....	....	11	6	7½	11½	11	11	..	....	....
Evening } %	6·0	5·2	7·6	....	....	....	5·0	3·4	7·0	4·8	6·0	6·0	..	....	....
	8	14	7	....	....	....	6	3	6	10	9½	9	..	..	..
	6.6	5.0	9.1	....	....	....	5·2	6·4	8·3	7·9	8·0	7·8	....	..	..
Butter Fat %	1.098	1.428	1.245	....	....	....	·862	·396	1·023	1·342	1·420	1·494	....	....	....

Ration	A.			B.						C.					
Name of Cow	Denmark Golden Dawn.	Denmark Velveteen.	Denmark Rosemary II.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.
Date.															
May 23	16	24	11½	19	17½	18½	....	....	....	....	....	....	17	16	14
May 24	18	22	12	18	14	16½	....	....	....	....	....	....	18½	19	11
May 25	16	22	13	19	17	18½	....	....	....	....	....	....	20	18	7
May 26	17	21	13	18	16	16½	....	....	....	....	....	....	20	17	8½
May 27	17½	22	11½	15½	16	18	....	....	....	....	....	....	21½	20	10
May 28	16½	22	12½	17	19	16½	....	....	....	....	....	....	19½	20½	8
May 29	16	23	12½	16½	17	16	....	....	....	....	....	....	21	24½	8
May 30	17	21	13	18½	14	19	....	....	....	....	....	....	20	22	10
May 31	16	21½	14	17	18½	18	....	....	....	....	....	....	21	23½	12½
June 1	18½	22	14½	18	17	18	....	....	....	....	....	....	20	22½	13
June 2	17	21½	16	17	18½	16	....	....	....	....	....	....	20½	24½	12½
June 3	17	21	13	17½	16	17	....	....	....	....	....	....	19	23½	11½
June 4	14	22	13	18½	17	15	....	....	....	....	....	....	19½	23½	11½
June 5	18	22	15	18	15	18½	....	....	....	....	....	....	16	24½	10
June 6	17½	21½	14½	16½	15	13½	....	....	....	....	....	....	18	25	5½
June 7	16½	21	15	17	17	16½	....	....	....	....	....	....	19½	24	9
June 8	16½	23	14	18	16	17	....	....	....	....	....	....	19	21	7
June 9	17½	20½	15	18½	17	15	....	....	....	....	....	....	19½	23	7
June 10	19	20½	14	16	15	17½	....	....	....	....	....	....	18	24	10
June 11	18	22	12½	15½	16½	18	....	....	....	....	....	....	17	26	8
June 12	18	23	14½	16	14½	17	....	....	....	....	....	....	18	25	8½
June 13	18	25½	14	16½	17	14½	....	....	....	....	....	....	18½	25	8½
June 14	18	20½	15½	17	12	20	....	....	....	....	....	....	18	25	6
June 15	19	21½	15	16½	20	17	....	....	....	....	....	....	20½	25	6
June 16	17½	23	13	19½	17	18	....	....	....	....	....	....	18	27	8
June 17	15	21	14	15	16	19	....	....	....	....	....	....	19	26	10½
June 18	17	22	14½	16	15½	20	....	....	....	....	....	....	22	24½	11
June 19	17½	21	15	14	18	19	....	....	....	....	....	....	19	24½	11
Morning { Weight	10	11	10	8	10	11	....	....	....	....	....	....	11	13½	6
Morning { %	5.3	3.6	7.2	5·1	5·5	6·4	....	....	....	....	....	....	5·2	4·5	6·0
Evening { Weight	7	10	6	6	8	9	....	....	....	....	....	....	8	11½	5
Evening { %	6.9	7.7	7.0	7·5	7·5	9·5	....	....	....	....	....	....	5·2	6·0	7·1
Butter Fat %	1.013	1.166	1.140	·858	1·150	1·559	....	....	....	....	....	....	·988	1·298	·715

Ration	A.			B.						C.					
Name of Cow	Denmark Golden Dawn.	Denmark Velveteen.	Denmark Rosemary II.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.	Denmark Angeline.	Denmark Reflectionette.	Denmark Acette.	Denmark Briar Rose.	Denmark Diana.	Denmark Standard's Dawn.
Date.															
June 20	17	20½	14	....	....	....	18	24	9	14	16	17	....	....	....
June 21	17	21	15	....	....	....	15	25	11½	20	19	19	....	....	....
June 22	16½	23	13½	....	....	....	16	25½	12½	15	20	19	....	....	....
June 23	16½	21	14½	....	....	....	16	25½	10	15½	18½	17	....	....	....
June 24	19	20	12	....	....	....	17	21	11	16	17	20½	....	....	....
June 25	16½	22	15	....	....	....	17	24	10	15	18	20	....	....	....
June 26	17	20	14	....	....	....	14	22½	9	12	17	17	....	....	....
June 27	18½	20	13	....	....	....	14½	19½	8	14	18	15	....	....	....
June 28	15½	21	15	....	....	....	15	22½	10½	10	18½	12	....	....	....
June 29	18	19	15	....	....	....	16	22	8	13	16½	15	....	....	....
June 30	15	21	14	....	....	....	15½	22	9	14	19	14	....	....	....
July 1	18	21	15	....	....	....	14½	24	12	14	18½	17	....	....	....
July 2	17	19	12	....	....	....	14	24	10	13	16	18	....	....	....
July 3	18	20	13	....	....	....	16	21	11	13	12	17	....	....	....
July 4	16	16	15	....	....	....	17	24	10	15	18	15	....	....	....
July 5	16	16	12	....	....	....	13	23	11	15	16	16	....	....	....
July 6	17	24	13	....	....	....	15	21	10	15	15	18	....	....	....
July 7	16	12	12	....	....	....	15	23	10	14	16	16	....	....	....
July 8	16	16	12	....	....	....	13	22	13	14	15	16	....	....	....
July 9	16	16	9	....	....	....	15	22	12	15	16	16	....	....	....
July 10	15	15	14	....	....	....	14	20	12	15	16	17	....	....	....
July 11	15	14	13	....	....	....	14	18	11	15	13	14	....	....	....
July 12	15	12	10	....	....	....	13	18	11	13	16	16	....	....	....
July 13	16	16	11	....	....	....	10	19	11	17	15	16	....	....	....
July 14	19	15	11	....	....	....	15	20	11	14	16	18	....	....	....
July 15	14	9	13	....	....	....	14	22	12	14	16	16	....	....	....
July 16	15	13	11	....	....	....	14	20	12	14	15	18	....	....	....
July 17	15	8	12	....	....	....	13	19	9	14	14	16	....	....	....
July 18	15	13	12	....	....	....	14	22	12	14	14	16	....	....	....
July 19	16	15	12	....	....	....	14	21	12	15	15	15	....	....	....
July 20	16	11	14	....	....	....	13	23	9	14	15	14	....	....	....
July 21	16	15	12	....	....	....	14	24	11	16	15	20	....	....	....
Morning Weight	9	9	7½	....	....	....	7½	13½	7	9½	9½	12	....	....	....
Morning %	5.2	6.4	6.6	....	....	....	4·4	5·5	5·5	5·3	5·7	6·6	....	....	....
Evening Weight	6½	5½	4	....	....	....	7	11	4	6	6	10	....	....	....
Evening %	6.8	6.8	7.7	....	....	....	6·8	7·3	6·8	6·2	7·4	9·4	....	....	....
Butter Fat %	.910	.950	.803	....	....	....	·806	1·546	·657	·876	·986	1·732	....	....	....

SOIL TYPES OF THE MARGARET RIVER DISTRICT.

By Robert Smith, Senior Research Officer.
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INTRODUCTION.

THE immediate aim of the soil survey is to delineate the soil types of a district. The soil type is the basic and indivisible unit in soil classification which corresponds to the species of botany and biology. Each soil type is an individual which is characterised not only by the surface layer but by the combined characteristics of the soil profile extending downward to a depth of several feet. The expression "soil profile" is used to describe the succession of soil layers or horizons that can be observed in a pit or road cutting. The upper layers from which materials such as clay, lime and soluble salts have been leached is known as the "A" horizon whereas the sub-soil zone where clay and other substances accumulate is called the "B" horizon. Below the "B" horizon lies the parent rock or "C" horizon. Each main horizon may be further subdivided into sub-horizons as A_1 (darkened by organic matter), A_2 (light coloured layer), B_1, B_2, etc.

In the agricultural use of land each soil type behaves in an individual way. Soil types which lie together in the same field may react quite differently to the ordinary farm operations. Every farmer, for instance, is familiar with the variations in drawbar pull experienced in the basic farm operation of ploughing. This individual reaction of different soil types is felt in all phases of agriculture, including for example, the complex fields of plant and animal nutrition. It is obvious, therefore, that if the agriculturist is to make full use of the land he must possess a working knowledge of the characteristics of the local soil types. The purpose of this article, then, is to describe in some detail the main soil types of a district where soil surveys have already been carried out. The field descriptions of the soils of the Margaret River district are supplemented by chemical analyses and by observations of agricultural properties. The author hopes that the accumulation of further knowledge of the properties of these soils will be a continuous process in which all agriculturists—farmers, extension and research workers—will play a useful part.

THE MARGARET RIVER DISTRICT.

The Margaret River district lies in the extreme South-Western corner of the State in the zone receiving more than 40 inches of rain per annum. The native vegetation consists of sclerophyll forest of which jarrah (*Eucalyptus marginata*) and marri (*E. calophylla*) are the dominant species. Agricultural use of the land, which is comparatively recent, is confined to the forested inland belt. The coastal limestone hills, forming a zone approximately three miles wide, are used only for rough grazing. Farms are located in groups on the better forest soils. Large areas of undeveloped land separate groups of farms so that the pattern of development is patchy. The farms themselves are still far from full development. In a recent farm survey of the area Rowley (1946) shows that on the average a third of every holding remains uncleared. This author also gives the effective size of holdings as 100 acres of sown pasture. She ranks farm enterprises in the

Figures 1 and 2.—A farm in process of development at the Nillup settlement. The soil type is Mungite sandy loam. It is late summer and the tufts of dry grass can be clearly seen. Standing dead timber is a feature of paddocks in this settlement.

following order of importance:—Butterfat, pigs, cull cattle, potatoes, poultry and apples. Production is based on the grazing of annual pastures of which subterranean clover is the chief constituent. This type of pasture produces a great bulk of feed in the spring but dries off in the summer and the amount of grazing is greatly reduced in late summer and autumn. Production, as a consequence is markedly seasonal. In terms of pounds of butterfat produced per acres of sown pasture, Roberts (1945) gives an approximate average figure of 54lbs. of butterfat per acre per annum.

Peculiarities of soils and climate are responsible for a number of agricultural problems. The leached nature of the soils has resulted in a series of mineral deficiencies for ordinary agricultural crops. After the initial gross phosphate deficiency had been overcome subterranean clover pastures flourished for a number of years. A deficiency of copper which soon appeared, however, resulted in failures of oat crops and "stalling" of subterranean clover and the replacement of these species by others with a lower copper tolerance (Jones and Elliott, 1945). The copper deficiency in the soil resulted in low copper intake by plants; the grazing cattle developed "falling disease," a condition due to copper deficiency in the grazing animal (Bennetts and Hall 1939, Bennetts 1941). This condition has since been overcome by the general application of copperised superphosphate in the Margaret River district. It is possible that further mineral deficiencies will appear in this area before an equilibrium is reached between farming practices and the soil environment. Jones (1948) reports a suspected case of potash deficiency on sandy soils in the Karridale area. The work of Carroll (1944) on the mineralogy of some soils from these districts shows a lack of variety among the heavy minerals, and further minor element deficiencies may develop as agriculture is intensified.

Fig. 3.
Typical jarrah forest on the Forest Grove gravelly sandy loam, Brockman Highway. There is a gravel pit in the foreground.

A further problem, connected with the very shallow nature of the A_1 horizon, was encountered when intensive development began. The surface layer, generally less than two inches thick, contained most of the organic matter and nitrogen and a large proportion of the available phosphate, potash and calcium. With deep ploughing this layer was buried and the subsoil subsurface exposed (A_2 horizon). The current method of development avoids ploughing the land until it has been in pasture for some years. The farmer ringbarks the trees, slashes the scrub and burns the area. The subterranean clover seed, together with a dressing of superphosphate is then scattered on the ash bed and a good establishment results.

The seasonal nature of production is a problem related to climate and soils. The dry summer and the comparatively low water holding capacity of most soils effectively prevent the establishment of perennial pasture plants. In consequence grazing stock must receive a supplementary ration in the late summer and autumn when production is at a very low level. This can be achieved by buying concentrates, by feeding cereal or clover hay conserved on the farm or by the development of summer pastures on summer-moist land. The total area of land with permanent water tables is adequate for the purpose of growing summer pastures on almost all farms but development in this direction has been slow. Problems of winter flooding and the selection and establishment of suitable species have not yet been solved.

There is a small timber industry which utilises the hardwood forests of the area. Speaking generally the quality of timber is not high; local edaphic conditions do not favour full development of the jarrah tree.

Fig. 4.
Typical winter swamp in virgin land near the Brockman Highway. This flat dries out for several months in the summer.

The State Forests Department is interested in the culture of softwoods in the Margaret River district; there are small plantations of *Pinus radiata* and *P. pinaster* at Margaret River and at Boranup. Some interesting nutritional problems have been described by O'Donnell and Lockhart (1945). *Pinus radiata* grows satisfactorily on brown soils developed in situ on the country rock (Keenan sandy loam). On lateritic soils pine growth is unsatisfactory but may be rectified by certain cultural treatments. Cultivation of the site both before planting and after establishment has a marked beneficial effect; zinc sulphate applied as a spray is beneficial in rehabilitating disordered pines. *Pinus pinaster,* having a lower fertility requirement, may be grown on soils on which *Pinus radiata* does not thrive.

SOIL PATTERNS.

In the Margaret River district, two distinct soil patterns can be seen. Firstly, the calcareous sandy soils of the coastal hills which are not used for agriculture and which will not be described further. Secondly, the slightly acid, gravelly, sandy or loamy soils of the jarrah forest which will be described in some detail. This soil pattern was examined in detail by spot surveys on farmland at Witchcliffe, Forest Grove (4,400 acres) and at Rosa Brook (3,250 acres). The Division of Soils, Council of Scientific and Industrial Research, which carried out these surveys also examined 120,000 acres of Crown land on the lower Blackwood River, north-east of Augusta, where the soils are similar to those of Margaret River. Further information on the soil pattern is provided by the soil survey of the Keenan Pine Plantation, Margaret River, described by O'Donnell and Lockhart (1945).

DESCRIPTION OF SOIL TYPES.

In the following descriptions it will be noted that related soil types are grouped into broader units called soil series. The soil types are characterised by the texture of the surface horizon and the types and series bear a proper name, generally of a locality. In describing the profile each horizon or sub-horizon is treated separately. In addition to the field description, the soil reaction, expressed according to the well known pH scale, is also shown. Other data, such as nitrogen content and clay content, is shown where available. All analyses are carried out on the fine earth fraction only, i.e., the material passing a two millimetre sieve. The fraction retained on the two millimetre sieve is referred to as gravel, the percentage of which is shown with the field description.

Only soil types of widespread extent and agricultural significance are shown. The most important agricultural soils belong to the Mungite and Forest Grove series. The Calgardup, Boodjidup and Willbay sands are less important types which are used for winter pastures. Gnarabup sand and the groups of alluvial and wet soils are classed as summer land which up to the present has been developed on a very small scale.

Mungite Series.—These soils are widely used for agriculture. They require surface drainage for best results. A fairly high water holding capacity enables pasture growth to continue into the early summer.

These profiles cover the greatest aggregate area in the district. They are found on level to gently sloping areas under a vegetation association of jarrah-marri-bull banksia (*Banksia grandis*). The parent material is a sandy clay of fluviatile origin. Drainage is somewhat restricted because of the heavy textured subsoil, and some temporary winter waterlogging occurs.

The series consists of three soil types—sand, sandy loam and loam. It may be noted here that following cultivation and the surface texture may be altered by admixture with deeper layers. Profiles in which ferruginous gravel occurs in the B_1 horizon are called the gravelly phase. Similarly, areas of Mungite sand or sandy loam which retain moisture into the summer months are grouped together as the wet phase. Typical profiles have the following features:—

MUNGITE SAND.

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–1½	Dark grey sand (sometimes loamy sand) with moderate amounts of organic matter and root material. Sharply defined from A_2	5·8	6	0·07
A_2	1½–12	Light yellowish grey sand with some root material merging into	5·9	7	0·02
	12–25	Light yellowish grey clayey sand ...	6·0	7	...
B	25–45	Light grey and yellow mottled sandy clay, brittle when dry, plastic when wet	5·8	18	...
BC	45–72	Yellow and grey mottled clay with some grit and slight ferruginous gravel	5·7	27	...

Mungite Sandy Loam

A_1	0–3	Dark grey sandy loam with moderate amounts of organic matter and root material. Sharply defined from A_2	5·8	16	0·25
A_2	3–8	Grey to light grey sandy loam, merging into B_1	5·8	22	0·07
B_1	8–25	Light grey sandy clay loam, brittle when dry, slightly plastic when wet	5·8	28	0·02
B_2	25–60	Light grey with yellow and red inclusions sandy clay, brittle when dry, plastic when wet	5·7	35	0·01

Mungite Loam—found only at the Nillup Settlement.

A_1	0–1	Dark grey loam with moderate amounts of organic matter and root material. A weak crumb structure. Sharply defined from A_2	6·2	21	0·39
A_2	1–5	Yellowish grey loam merging into B_1	5·8	22	0·22
B_1	5–15	Light grey, with slight yellow mottling clay, hard when dry, plastic and stiff when wet	5·5	38	...
	15–45	Light grey, with yellow and red mottling clay	5·3	41	...
BC	45–108	Light grey, with red and yellow mottling, clay with slight ferruginous gravel	5·2	50	...

Forest Grove Series.—These soils are arable except where laterite boulders occur. They are widely used for agriculture. Surface drainage is good but water-holding capacity is rather low.

These profiles have a widespread distribution in the district. They are found on gently sloping areas under a vegetation association of jarrah-marribull banksia which is sometimes replaced by jarrah-sheoak association. The parent material is a sandy clay with a well-developed surface laterite horizon. Drainage is freer than in the Mungite series but some temporary winter waterlogging occurs.

The series consists of three soil types:—Gravelly sand, gravelly sandy loam and gravelly loam. Where lateritic boulders occur as a surface formation a boulder phase is recognised. Typical profiles have these features:—

FOREST GROVE GRAVELLY SAND.

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–1½	Grey gravelly sand with moderate amounts of organic matter. Some lateritic gravel scattered on surface. Merges into A_2. Gravel 86% ...	6·2	6	0·31
A_2	1½–14	Yellowish grey very gravelly sand. Gravel 81%	6·4	4	0·04
B_1	14–24	Yellowish grey very gravelly clayey sand with boulders. Gravel 87% ...	6·4	8	...
B_2	24–39	Yellowish grey very gravelly clay, with boulders. Gravel 11%	6·5	57	...
BC	39–84	Mottled light grey, yellow and red gravelly clay; fragmentary when dry, plastic when wet. Gravel 29%	5·9	58	...

Forest Grove Gravelly Sandy Loam.

A_1	0–1½	Dark grey, very gravelly sandy loam with moderate amounts of organic matter. Some lateritic gravel scattered on surface. Gravel 77% ...	7·4	10	0·25
A_2	1½–12	Greyish yellow, very gravelly sandy loam. Gravel 73%	6·6	13	0·06
B_1	12–18	Greyish yellow very gravelly sandy clay loam with boulders. Gravel 72% ...	6·3	22	...
B_2	18–48	Greyish yellow very gravelly clay with frequent boulders. Gravel 75% ...	6·4	43	...

Forest Grove Gravelly Loam—rarely seen.

A_1	0–1	Grey gravelly loam with moderate amounts of organic matter	...	...	...
A_2	1–8	Yellowish grey gravelly loam.	...	...	...
B_1	8–18	Yellowish grey and yellowish brown gravelly sandy clay loam with boulders	...	...	...
B_2	18–48	Dull yellow and yellow brown mottled very gravelly clay with frequent boulders	...	...	...

Calgardup Sand.—This soil has low water holding capacity and free drainage. It is useful only for winter pastures.

The Calgardup is a podsolised sand of fluviatile origin occurring as valley deposits and as broader outwash areas near the Blackwood River frontage. The drainage is very free and there is a characteristic vegetation association of jarrah-marri-bull banksia. The normal colour of the profile is yellow. A brown phase has also been mapped in the surveyed area. A typical profile is described as follows:—

Horizon.	Depth.	Description.	Reaction. (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–1	Dark yellowish grey sand with moderate amounts of organic matter	5·6	2	0·08
A_1	1–27	Yellow sand, loose when dry, slightly coherent when wet	6·5	4	...
B	27–72	Yellow sand with slight grit and very slight ironstone gravel	6·6	5	...
	72–110	Yellow sand, slightly coherent (slight increase in clay fraction) with slight grit and slight ironstone gravel			
BC	110–120	Yellow brown clayey sand with ironstone gravel			

Fig. 5.

Poor wet flats of the Scott River Plains which, under present conditions, have no agricultural value. The massive ironstone hardpan lies a few inches below the sandy surface and is seen exposed in the car tracks.

Willbay Sand.—This soil is droughty and very infertile. It is not used agriculturally.

The Willbay sand was first recognised and mapped at Denmark (Hosking and Burvill, 1938). It is essentially a highly leached, quartzose sand, which occurs extensively in the south coastal areas. The parent material is a fluviatile sand forming valley deposits and as broader outwash areas. Drainage is very free. There is a characteristic vegetation association of *Banksia ilicifolia and B. attentuata* forming an open woodland with a scrubby undergrowth. The fertility status appears to be extremely low. A typical profile is as follows:—

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–8	Grey to dark grey sand with considerable raw humus (brownish coloured) and root material ...	6·7	2	...
A_2	8–20	Light grey sand, incoherent whether wet or dry	4·8	...	...
	20–84	White sand as A_2	4·9	...	...

Gnarabup Sand.—This soil is excessively wet in winter but is used for summer crops with liberal fertilizer.

This soil is a typical humus podsol. The A_1 is a zone of raw humus accumulation, the A_2 is highly bleached, and a black humus pan occurs in the B_2. It is typical of the wet heath soils which occur extensively in the south coastal areas. The land surface is flat and the soil type may occur on the highest part of the watershed as well as on outwash areas, where drainage is restricted and appropriate parent materials occur. The soil is waterlogged in winter, and a water table may persist throughout the summer. There is a characteristic heath vegetation with which is associated the Christmas tree (*Nuytsia floribunda*). The parent material is a highly quartzose sand of fluviatile origin overlying a clay layer. A typical profile has these features:—

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–5	Very dark grey to black, speckled sand with considerable raw humus	4·6	Less than 2	0·41
A_2	5–12	Grey sand, loose and incoherent ...	4·7	Less than 2	0·11
	12–24	Light grey sand, loose and incoherent	5·0	Less than 2	...
B_1	24–39	Light brownish grey sand	5·2	Less than 2	...
	39–46	Very dark brown and black organic and ferruginous hardpan. Very hard.	4·7	2	0·05
	46–60	Dark brown organic hardpan. Very hard	...	...	...
B_2	60–69	Yellow and brown mottled clay with slight organic stain	4·6	26	0·07
	69–75	With medium ferruginous gravel ...	...	...	...
BC	75–81	Light grey and red mottled clay ...	...	...	...

Boodjidup Sand.—This soil has low water holding capacity and fair winter drainage. It is used to a limited extent for winter pastures.

The Boodjidup sand is of similar origin to the Gnarabup. It differs from the latter in its freer drainage and its less well developed accumulation of raw humus in the A_1 horizon. It is found on gentle slopes of watersheds under a stunted vegetation association of jarrah-marri-bull banksia. The parent material, as in the Gnarabup is a quartzose fluviatile sand. This soil type is of rather restricted occurrence, and its profile has these characters:—

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–1	Speckled grey and dark grey sand with moderate amounts of organic matter and root material. Sharply divided from A_2	6·0	Less than 2	0·15
A_2	1–7	Speckled grey and light grey sand with root material; loose when dry, incoherent when wet, merging into	5·9	Less than 2	0·04
	7–24	Very light grey sand, loose when dry, incoherent when wet	5·9	Less than 2	0·01
B_1	24–36	Brown organic stained sand	5·8	7	0·01
	36–69	Dark brown to black organic hardpan with some grit and gravel ...	5·5	8	0·05
BC	69–84	Light bluish grey with green mottlings heavy clay	4·8	66	0·02

Wet Soils.—These soils have not been developed agriculturally. They are too wet in winter but some may have a use for summer crops.

This is a miscellaneous group of soils found in shallow depressions and blocked drainage lines. They are all subject to winter flooding but the summer water regime varies rather widely. The soils range from meadow podsols to bog soils and have been grouped broadly as S_1, S_2, S_3, and S_4 on the basis of profile features. S_2 and S_3 are the most widely distributed types. The vegetation associations vary rather widely. Paperbarks (*Melaleuca spp.*), *Banksia littoralis* and teatree (*Agonis sp.*) are prominent species, with rushes dominant in the very wet localities. Profiles representative of each grouping are described as follows:—

S_1.

Peat swamps with permanent shallow water tables.

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
	0–33	Black humified peat, very wet ...	...	...	...
	33–45	Very dark grey to black, peaty sand clay, very wet	...	...	...

S_2.

Wet soils formed on sands of fluviatile origin. Meadow podsols.

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
	0–24	Dark grey sand with moderate amounts of organic matter	...	...	...
	24–42	Dark grey sand with organic stain, very wet	...	...	...
	42–72	Light grey sand with faint organic stain, very wet	...	...	...

S_3.

Wet soils formed on sands and clays of fluviatile origin. Meadow podsols.

A_1	0–5	Grey loamy sand with moderate amounts of organic matter, fairly well defined from A_2	5·5	7	0·06
A_2	5–17	Light yellow grey, slightly mottled, clayey sand, hard and brittle when dry, slightly plastic when wet ...	5·4	14	...
B_1	17–30	Yellowish grey sandy clay loam, friable when dry, plastic when wet ...	5·2	21	...
B_2	30–72	Yellow grey, with yellow and red-brown mottling, sandy clay	5·2	28	...

S_4.

Shallow basins with massive laterite horizons.

A_1	0–6	Very dark grey loamy sand with moderate amounts of organic matter	...	...	...
A_2	6–24	Light yellowish grey gritty sand ...	...	...	...
B	24–+	Massive ironstone hardpan	...	...	...

Alluvial Soils.—These soils are excessively wet in winter but are useful for summer grazing. There is some development with paspalum and kikuyu grass. They have good possibilities.

Alluvial soils are fairly extensive formations in parts of the area. They occur as long narrow bands associated with creeks. The parent material consists of recent waterlaid deposits together with some colluvial material from the valley sides. The vegetation association varies, and is generally more luxuriant than on other soils of the area. Soil profiles range from grey podsolised sands to brown loams. Two typical profiles are described below:—

Profile 1.

A_1	0–4	Greyish brown loam with small amounts of fine gravel	5·2	19	0·13
B	4–15	Brown light clay, plastic when wet ...	6·5	45	0·05
	15–24	Bright brown clay	5·8	61	...
BC	24–48	Yellowish grey and red mottled clay ...	5·7	59	...
	48–72	Light yellowish grey, yellowish grey and red mottled, clay	5·5	57	...

Profile 2.

Horizon.	Depth.	Description.	Reaction (PH).	Clay.	Nitrogen.
	Inches.			%	%
A_1	0–5	Drab yellowish grey gravelly loam with crumb structure merging into B_1 ...	5·5	33	0·08
B_1	5–13	Yellowish grey with yellow inclusions, clay, powdery when dry, plastic when wet. Merges into next horizon ...	5·6	38	0·08
	13–32	Yellowish grey, with yellow, red and grey inclusions, sandy clay with slight gravel	5·4	42	0·03
BC	32–50	Yellowish grey with yellow and some red-brown inclusions, sandy heavy clay with moderate gravel	...	...	...

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ERRATA.

Journal of Agriculture, Volume XXV. (Second Series), No. 3, September, 1948.

Contents Page, eighth item, for "The Control of Root-Knot with D.D.T." substitute "The Control of Root-Knot with D.D."

Page 224, Fig. 9 caption, second line for "(Gand H)" substitute "(G and H)".

Page 227, paragraph 6, last line for "A louvred winder" substitute "A louvred window."

Page 265, paragraph 2, second line, for "Classing of such clips to the best" substitute "Classing of such clips only calls for".

Page 274, caption under illustration, for "Tender wool fibres have broken" substitute "Tender wool. Fibres have broken."

Page 279, paragraph one, line one, for "black or grey fibre" substitute "black or grey fibres."

OFFICIAL AUSTRALIAN PURE BRED DAIRY CATTLE RECORDING SCHEME.

M. Cullity, Superintendent of Dairying; B. H. Drakes, Assistant, Dairy Records.

IN previous years in reporting upon the operation of the Official Australian Pure bred Dairy Cattle Recording Scheme attention was drawn to the relative small number of herds which were submitted for testing and reference was also made to the fact that there were a number of breeders of pure bred cattle who were able to obtain high prices for the progeny of their herds solely because of the good work carried out by those who were consistently submitting their herds for testing.

During the year 1947-48, the number of herds submitted showed an increase while the number of cows was higher than in any previous year. However, the average results were not as good as could be expected. The yield of 297lb. of butter-fat is lower than for many years. Although this is undoubtedly due to the entry to test for the first time of a number of new herds, it is believed that breeders generally could, with very little effort, obtain better results.

This comment can also be applied to the number of cows which have achieved "standard" production. These represent 54 per cent. only of those entered for test. In other words, 46 per cent. did not reach standard. In view of the favourable season this figure is disappointing.

It is realised that the low percentage achieving standard production would not apply to every herd as there are a number where the great proportion of the cows are high producers. It follows, therefore, that there are other herds in which almost all cows are producing below the standard required. This is a serious matter, particularly from the point of view of the commercial dairy farmer, who looks to the pure bred herds as a source of bulls capable of lifting production. That this is so is due to the consistently good result achieved over a number of years by a few pure bred herd owners who have been responsible for building up the industry with a large number of satisfactory bulls.

Unfortunately the good work of these few men is being used by others who have not shown similar results, in order to obtain good prices for their surplus bulls.

A survey of the causes of low yields indicates that in many cases they are due to a low inherent-capacity for production posssesed by many of the cows. It appears that culling from pure bred herds is rarely carried out with a view to lifting the general average quality of the purcherds at large. Where culling does occur, the surplus animals often find their way into other herds, usually of men who aim to become stud breeders.

It also is apparent that in many pure bred herds, particularly those commenced in recent years, the bulls in use are incapable of producing progeny of better quality than the cows with which they are mated. It is becoming increasingly urgent that only "proved-for-production" bulls should be used in stud herds.

There is also no doubt that poor management both in respect to feeding and general husbandry has contributed to low yields.

In an endeavour to encourage breeders to look upon herd-testing as a means of improving their herds, rather than a method of advertising a few individual high yields, the administration of the rules governing the scheme has been made more stringent to ensure that only those cows which can be exempt under the rules are not tested.

It is hoped that breeders will endeavour to use the data provided as a means of lifting the average quality of their herds rather than as a means of obtaining one or two high performances from individual cows, with a view to using such records as a means of advertising their herds.

The number of cows completing test during the year was 676 from 46-herds, compared with 517 cows from 35-herds the previous year. This is an increase of 30.7% on the number of cows.

Of the above number, 69 cows were withdrawn for various reasons before completing 150 days, and these are not included in any of the averages.

The remaining 607 cows averaged 6,386lbs. milk. Average test 4.65%, and 297.24lbs. butterfat, or 1.29lbs. of butterfat less than the previous year.

The average production of all cows completing test since 1934 is shown in Table 1.

TABLE 1.

AVERAGE PRODUCTION—PURE BRED HERDS.

Year.	No. of Cows Completing Test.	Average Butterfat per Cow.
		lb.
1934–35	305	320.26
1935–36	367	297.17
1936–37	319	300.87
1937–38	333	298.08
1938–39	375	292.40
1939–40	382	305.88
1940–41	372	298.38
1941–42	290	322.84
1942–43	294	321.27
1943–44	289	311.57
1944–45	344	289.42
1945–46	393	279.93
1946–47	460	298.53
1947–48	607	297.24

The percentage of cows passing standard since 1937-38 is shown in Table 2. Compared with the previous year, the percentage of all breeds passing a standard shows a slight increase, viz.:—1.9%, Jerseys showed an increase of 9.6%, Guernseys an increase of 11.8%, and A.I.S. a decrease of 11.7%.

It will be seen that the percentage of all breeds passing standard is still only 54%.

TABLE 2.

PERCENTAGE OF COWS PASSING STANDARD.

Year.	Australian Illawarra Shorthorn.	Guernsey.	Jersey.	Total.
	%	%	%	%
1937–38	59.1	58.7	35.6	53.1
1938–39	53.8	71.4	55.2	57.9
1939–40	48.0	77.5	64.2	59.2
1940–41	52.0	61.0	51.0	54.0
1941–42	73.0	68.3	59.7	68.3
1942–43	67.6	67.9	55.0	64.3
1943–44	57.8	52.1	73.3	61.9
1944–45	52.5	43.4	72.2	57.3
1945–46	43.1	33.3	52.9	43.8
1946–47	56.1	42.6	53.6	52.1
1947–48	44.4	54.4	63.2	54.0

The number of cows passing standard, and the proportion in each age group of each breed is set out in Table 3. The percentage of mature cows passing standard (40.9%) is lower than in any of the other age groups.

It is interesting to note that the percentage of cows passing standard in the age groups from Jr.4 (43.4%) shows a progressive increase down to the Jr. 2-year-olds, which show the highest percentage of any age group, viz.:—68.0%.

TABLE 3.

COWS PASSING STANDARD.

Age Class.	A.I.S.		Guernsey.		Jersey.		All Breeds.	
	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.
Mature	57	14	37	16	72	38	166	68
Senior 4 years	8	1	5	5	17	11	30	17
Junior 4 years	17	4	9	5	20	11	46	20
Senior 3 years	34	15	11	6	24	15	69	36
Junior 3 years	24	10	11	8	28	16	63	34
Senior 2 years	25	15	15	9	27	16	67	40
Junior 2 years	80	50	24	12	62	51	166	113
Total	245	109	112	61	250	158	607	328
Percentage	44 4		54 4		63.2		54.0	

The average production of milk and butterfat in each age group of each breed is shown in Table 4. The only age groups (all breeds) which failed to reach standard were the mature and senior three-year-olds. The junior two-year-olds gave the best relative performance. The mature cows (all breeds) were approximately 20lbs. butterfat higher than last year.

In the A.I.S. breed the only two age groups to exceed standard were the senior two and junior two-year-olds, while all age groups in the Guernseys, except

matures, exceeded standard. The Jersey breed put up a noteworthy performance, all age groups being well over standard. A further study of this table shows that in comparison with last year, the A.I.S. breed averaged 32.17lbs. less, the Guernseys 20.96 more, and Jerseys 11.86 more. The 250 Jerseys (all age groups) averaged 6,088lbs. milk, and 325.70lbs. butterfat, which is very creditable.

TABLE 4.

AVERAGE PRODUCTION IN EACH AGE CLASS—1947-48.

AGE CLASS.	Butter Fat Standard Required lb.	A.I.S.				Guernsey.			
		No. of cows.	Average Milk lb.	% Test.	Average Butter Fat lb.	No. of Cows.	Average Milk lb.	% Test	Average Butter Fat lb.
Mature	350	57	7,470	3·88	290·41	37	6,448	5·14	331·52
Senior 4 years	330	8	7,184	3·82	274·90	5	7,606	5·34	406·90
Junior 4 years	310	17	7,152	3·83	274·16	9	6,702	4·93	330·72
Senior 3 years	290	34	7,076	3·38	239·44	11	6,155	5·10	314·37
Junior 3 years	270	24	6,830	3·89	267·12	11	6,227	4·93	307·41
Senior 2 years	250	25	7,001	3·87	271·09	15	5,858	5·24	307·11
Junior 2 years	230	80	6,108	3·97	243·10	24	4,992	5·07	253·36
TOTALS	....	245	6,831	3·83	262·00	112	6,079	5·11	310·76

AGE CLASS.	Butter Fat Standard Required lb.	Jersey.				All Breeds.			
		No. of cows.	Average Milk lb.	% Test.	Average Butter Fat lb.	No. of Cows.	Average Milk lb.	% Test	Average Butter Fat lb.
Mature	350	72	7,044	5·22	360·90	166	6,058	4·80	333·40
Senior 4 years	330	17	6,451	5·36	346·12	30	6,839	4·93	337·26
Junior 4 years	310	20	6,194	5·56	344·69	46	6,647	4·75	315·89
Senior 3 years	290	24	6,298	5·37	338·59	69	6,659	4·29	285·87
Junior 3 years	270	28	5,432	5·41	294·30	63	6,113	4·68	286·24
Senior 2 years	250	27	5,333	5·16	275·29	67	6,103	4·62	280·85
Junior 2 years	230	62	5,391	5·48	295·55	166	5,679	4·65	264·18
TOTALS	....	250	6,088	5·34	325·70	607	6,386	4·65	297·24

A comparison between the production of all cows under test 150 days and over, with cows completing 273 days—according to breed and age class is set out in Table 5. A study of the 273 day averages discloses that all the age groups in each breed, with the exception of the mature and senior four-year-old A.I.S., exceeded the standard of butterfat for their respective age groups. This is a decided improvement on the previous year, when it will be recalled that in the mature cow classes the only breed to exceed standard was the A.I.S.

It will also be noted that the 273-day average for all breeds is higher this year in all age groups except the senior four and senior three-year-olds.

Of the 607 cows included in the averages, 72.6% completed 273 days, compared with 80% last year, and 72% in 1945-46.

Table 5.

COMPARATIVE TABLE SHOWING AVERAGE PRODUCTION IN EACH AGE CLASS OF COWS UNDER TEST 150 DAYS OR OVER AND COWS COMPLETING 273 DAYS.

Age Class.	Standard Butter Fat Required.	A.I.S.				Jersey.			
		No. of Cows Tested 150 days or over.	Average Butter Fat lb.	No. of Cows Completing 273 days.	Average Butter Fat lb.	No. of Cows Tested 150 days or over.	Average Butter Fat lb.	No. of Cows Completing 273 days.	Average Butter Fat lb.
Mature	350	57	290·41	29	336·98	72	360·90	59	394·26
Senior 4 years	330	8	274·90	6	271·80	17	346·12	13	391·51
Junior 4 years	310	17	274·16	7	350·36	20	344·69	15	354·04
Senior 3 years	290	34	239·44	23	313·46	24	338·59	22	343·63
Junior 3 years	270	24	267·12	11	315·85	28	294·30	15	320·59
Senior 2 years	250	25	271·09	21	281·01	27	275·29	17	311·31
Junior 2 years	230	80	243·10	64	261·61	62	295·55	55	311·85

Age Class.	Standard Butter Fat Required.	Guernsey.				All Breeds.			
		No. of Cows Tested 150 days or over.	Average Butter Fat lb.	No. of Cows Completing 273 days.	Average Butter Fat lb.	No. of Cows Tested 150 days or over.	Average Butter Fat lb.	No. of Cows Completing 273 days.	Average Butter Fat lb.
Mature	350	37	331·52	25	381·00	166	333·40	113	376·63
Senior 4 years	330	5	406·98	5	406·90	30	337·26	24	364·79
Junior 4 years	310	9	330·72	8	347·73	46	315·89	30	351·50
Senior 3 years	290	11	314·37	9	334·81	69	285·87	54	329·12
Junior 3 years	270	11	307·41	10	323·79	63	286·24	36	320·03
Senior 2 years	250	15	307·11	11	351·31	67	280·85	49	307·31
Junior 2 years	230	24	253·36	16	296·24	166	264·18	135	286·18

Leading Sires:

The leading sire for the year was again the Jersey bull, "Mornmoot Northwood Beau," owned by R. H. Rose & Son. His best six daughters averaged, with allowances, 567.81lbs. butterfat. He was followed by the Guernsey bull, "Koojan Ace's Warspite" (Denmark Research Station), 500.36lbs. butterfat, and "Congelin Mandarin" (Jersey), owned by D. Bradford, 404.17lbs. butterfat. Averages of the six best, and all daughters are shown in Table 6.

The performances of 21 sires for the years 1943-44 to 1947-48 are given in Table 7. In each case the productions are shown with and without allowances. Where daughters have had more than one lactation the yield included is the average of all of such daughters' lactations.

TABLE 6.

LEADING THREE SIRES, 1947–48.

Name of Bull.	Owner.	Sire.	Dam.	Average Production of six best daughters.		Average Production of all daughters under test.		
				Without allowances (lbs. butter fat).	With allowances (lbs. butter fat).	No. of Daughters under Test.	Without allowances (lbs. butter fat).	With allowances (lbs. butter fat).
Mornmoot Northwood Beau (Jersey) (17798)	R. H. Rose & Son	Glen Iris Golden Beau (14629)	Mornmoot Northwood Madeira 7th (63202)	505 .67	567 .81	24	360 .08	410 .82
Koojan Ace's Warspite (Guernsey) (5943)	Denmark Research Station	Homestead Ace (Imp.) U.S.A. (1631)	Koojan Ideal's Jewel (7257)	395 .11	500 .36	7	379 .25	482 .04
Congelin Mandarin (Jersey) (14542)	D. Bradford	Clarendon Eyre Oxford Gamboge (10274)	Clarendon Eyre Tangerine 6th (43396)	330 .33	404 .17	9	292 .24	357 .81

TABLE 7.

AVERAGE PRODUCTION OF DAUGHTERS OF 21 SIRES, YEARS 1943–44 TO 1947–48.

Name of Bull.	Breed.	Sire.	Dam.	Average Production of all Daughters.			
				No. of Daughters under Test.	Total Number of Lactations. *	Without Allowances (lbs. butter fat).	With Allowances (lbs. butter fat).
Austral Park Wonderful Standard (12423)	Jersey	Ellerdale Wonderful Masterman (11561)	Ellerdales Wonder Golden (47992)	17	22	449.70	485.79
Mornmoot Northwood Beau (17798)	Jersey	Glen Iris Golden Beau (14629)	Mornmoot Northwood Madeira 7th (63202)	33	59	384.34	460.97
Grassvale Gold Boy (14684)	Jersey	Belgonia Gold Boy (12458)	Grassvale Lady Fowler 17th (48536)	14	26	415.16	452.82
Mornmoot Laver (17792)	Jersey	Werribee Laverock (9085)	Mornmoot Princess Madeira 9th (58569)	10	10	324.66	420.56
Homestead Ace (Imp.) U.S.A. (1631)	Guernsey....	Archer of Cloture (Imp.) (133,486)	Laddie's Blossom (118,788)	12	21	346.07	409.35
Koojan Ideal's Dictator (4167)	Guernsey ..	Glenburnie Ideal (Imp.) U.S.A. (2548)	Koojan Golden Butterfly (4339)	12	12	339.19	401.88
Greenmount Golden Sultan (14688)	Jersey	Bellefaire Bonaparte's Bonetienne (9224)	Charming Lass of Greenmount (20903)	10	21	361.38	397.70
Koojan Beau Ideal (4965)	Guernsey....	Glenburnie Ideal (Imp.) U.S.A. (2548)	Koojan Ace's Mignonette (3898)	12	21	341.13	397.07
Wooroloo Red Baron (6412)	A.I.S.	Parkview Guardian (2557)	Wooroloo Bloomer (5218)	17	26	315.30	392.46
Summerlea Churchill (6236)	A.I.S.	Summerlea Togo (1527)	Summerlea Empress (14247)	17	18	302.47	382.32
Selsey Wyandottes Prince (18058)	Jersey	Samares Golden Prince (Imp.) (13439)	Selsey Wyandotte (41949)	18	18	328.78	355.14

TABLE 7—*continued.*

AVERAGE PRODUCTION OF DAUGHTERS OF 21 SIRES, YEARS 1943-44 TO 1947-48—*continued.*

Name of Bull.	Breed.	Sire.	Dam.	Average Production of all Daughters.			
				No. of Daughters under Test.	Total Number of Lactations. *	Without Allowances (lbs. butter fat).	With Allowances (lbs. butter fat).
Westby Monarch (5404)	A.I.S.	Westby Starlight (3604)	Westby Carnation 2nd (18515)	13	13	275.08	348.98
Tipperary Ace (6336)	A.I.S.	Blackland's Monarch's Commander (1877)	Yallah Farm Maggie 2nd (1272)	21	34	281.46	342.19
Blackland's Jean's Supreme (1871)	A.I.S.	Fussy's Monarch of Hillview (493)	Jean 7th of Blacklands (7425)	12	12	284.80	330.15
Navua Coronation Star (14929)	Jersey	Dreamer's Hamptonne Star (Imp.) (12384)	Navua Coronation Cecilia (41235)	10	10	293.98	311.59
Rosecliffe Marchalong (15094)	Jersey	Rosecliffe Flowers' Bravo (12121)	Rosecliffe Viola (35771)	10	20	271.20	309.73
Westby Masterpiece (5403)	A.I.S.	Westby Searchlight (3604)	Westby Pearl (15140)	18	18	248.77	303.30
Newstead Royal Sun (7252)	A.I.S.	Newstead Royal Chief (6040)	Newstead Emerald 46th (26901)	12	12	241.28	283.75
Glanavon Genius (3957)	A.I.S.	Villiers of Darbalara (2386)	Gold 11th of Raleigh (17507)	12	13	226.38	249.12
Cranbourne Charlie (3993)	Guernsey	Broofield's Prince Henry (3257)	Koojan Ace's Doreen	13	13	197.23	246.81
Tipperary Amy's Mascot (6338)	A.I.S.	Newstead Royal Light (3416)	Tipperary Amy (18313)	11	11	190.06	227.31

* In compiling this table where daughters have had more than one lactation, the yield included, is the average of all of such daughter's lactations.

The productions of the three leading cows in each age class are given in Table 8. It will be seen that two were over 700lbs. butterfat, one over 600lbs. butterfat, eight over 500lbs. butterfat, and ten over 400lbs. butterfat. Fourteen of the twenty-one cows are Jerseys, five Guernseys, and two A.I.S.

TABLE 8.

PURE BRED HERD TESTING.

THREE LEADING COWS IN EACH AGE CLASS, 1947-48.

Name of Cow.	Breed.	Milk.	Average Test.	Butter Fat.	Owner.
MATURE (STANDARD 350 LBS. BUTTERFAT)					
Camden Ariadne	Jersey	10869	6·94	754·37	C. E. Kruger
Congelin Iolanthe 8th	Jersey	13215	5·57	737·19	D. Bradford
Mokine Beauty	Jersey	11625	5·54	644·50	T. H. Wilding
SENIOR 4 YEAR OLD (STANDARD 330 LBS. BUTTERFAT)					
Grass Vale Silvermine 2nd	Jersey	9990	5·31	530·70	R. H. Rose & Son.
Walgett Handsome Girl 29th	Jersey	7263	6·91	502·05	C. J. Cunningham
Travalgan Lady Eion 16th	Jersey	8280	5·74	475·53	W. H. & T. F. Robinson
JUNIOR 4 YEAR OLD (STANDARD 310 LBS. BUTTERFAT)					
Grass Vale Golden Cream 26th	Jersey	8677	6·18	536·92	R. H. Rose & Son
Travalgan Starbright 23rd	Jersey	8310	6·21	515·76	J. C. Bushell
Muresk Anna	Guernsey	10663	4·60	491·12	Muresk Agricultural College
SENIOR 3 YEAR OLD (STANDARD 290 LBS. BUTTERFAT)					
Grass Vale Eve	Jersey	9217	5·79	533·95	R. H. Rose & Son
Carydale Precious	Jersey	9492	5·51	523·37	G. Layman
Capel Gibson Girl 2nd	A.I.S.	12396	4·01	498·23	B. W. Prowse
JUNIOR 3 YEAR OLD (STANDARD 270 LBS. BUTTERFAT)					
Juadine Peerless Lily 23rd	Jersey	9329	5·90	551·27	M. B. Stott
Denmark Bonnie Marie	Guernsey	8022	5·56	446·74	Denmark Research Station
Greyleigh Precious Gem 3rd	A.I.S.	10902	3·89	424·19	W. G. Burges
SENIOR 2 YEAR OLD (STANDARD 250 LBS. BUTTERFAT)					
Grass Vale Buttercup 17th	Jersey	9394	5·22	490·86	R. H. Rose & Son
Denmark Ace's Velvet	Guernsey	7545	5·97	450·16	Denmark Research Station
Muresk Helianthus	Guernsey	8598	5·22	449·60	Muresk Agricultural College
JUNIOR 2 YEAR OLD (STANDARD 230 LBS. BUTTERFAT)					
Carydale Royal Princess	Jersey	8611	6·07	522·98	G. Layman
Denmark Golden Veronica	Guernsey	7299	6·03	440·72	Denmark Research Station
Travalgan Lady Eion 27th	Jersey	7389	5·77	426·56	W. H. & T. F. Robinson

New Records.

Five new records were established during the year:—

Jersey (Mature Class, 273-days), and 365-day Record—All Breeds.

"Camden Ariadne," owned by C. E. Kruger, produced 10.869lbs. milk; average test, 6.94%, and 754.37lbs. butter fat in 273 days. This is 72.64lbs. butterfat better than the previous record put up by "Juadine Peerless Lily 13th" in 1946. "Camden Ariadne," who is by "Greenmount Golden Sultan" from "Greenmount Sweet Wonder," also holds the junior four-year-old (Jersey) record with 8,764lbs. milk, average test 6.84%, and 600.32lbs. butterfat.

After completing her 273 day record referred to above, "Camden Ariadne" continued under test to 365 days, her production then being 12,975lbs. milk, aver-

age test 7.0%, and 908.85lbs. butterfat, which establishes a new 365 day record for the State. The previous 365 day record was held since 1928 by the Guernsey cow "Picton Trequeen Flirt," owned by A. W. Padbury, her production being 16,675lbs. milk with an average test of 5.21%, equal to 870.06lbs. butterfat.

Jersey Junior Two-year-old Class. West Australian-bred, Junior Two-year-old Class. All Breeds Junior Two-year-old.

"Carydale Royal Princess," owned by G. Layman, of Donnybrook, gained the record for all three of the above classes, her production being 8,611lbs. milk. Average test, 6.07, and 522.98lbs. butterfat. The record for the two latter classes was previously held by "Koojan Ideal's Daphne" (Guernsey), owned by A. W. Padbury, with 8,821lbs. milk, average test 5.54%, and 489.13lbs. butterfat, and the record for the Jersey Junior Two-year-old Class was held by "Grass Vale Northwood Eve" (R. H. Rose & Son)—7,755lbs. milk, average test 5.81%, and 451.23lbs. butterfat.

The new record holder, "Carydale Royal Princess," is by "Juadine Royal," whose dam, "Juadine Queen," held the Jersey junior two-year-old record in 1943 with 421.64lbs. of butterfat. Her dam is "Colmyn Janis 2nd," who produced 292.30lbs. of butterfat in 273 days as a senior two-year-old.

The productions of all cows completing test during the year are shown in Table 9.

TABLE 9—HERD TESTING.

Cows which completed test during the twelve months ended 30th June, 1948.

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS UNDER 2½ YEARS—STANDARD 230 LBS. BUTTER-FAT.											
Carydale Royal Princess	Jersey	....	26-6-45	4-4 47	273	20·5	8,611	6·07	522·98	G. Layman	Juadine Royal (20841)
Denmark Golden Veronica	Guernsey	12686	17-8-45	4-10-47	273	23	7,299	6·03	440·72	Denmark Research Station	Denmark Ace (5738)
Travalgan Lady Eion 27th	Jersey	....	29-4 45	29-6 47	273	23	7,389	5·77	426·56	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Muresk Dora	Guernsey	13928	26-8-44	9 2 47	273	33	9,429	4·43	418·31	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Grassvale Lady Fowler 46th	Jersey	....	15-5 45	25 8 47	273	21·5	6,909	5·89	407·16	R. H. Rose & Son	Glen Iris Golden Oxford (12694)
Warralyn Marie 12th	Jersey	....	27 5 45	24-5-47	273	19	6,807	5·97	406·49	M. B. Stott	Juadine Sparkles' Wonder (18659)
Colmyn Jewel	Jersey	.	2-9-45	20-8-47	273	13	6,609	6·13	405·64	C. M. Ironmonger	Eungella Prince Starbright (19538)
Grassvale Golden Cream 28th	Jersey	. .	20 6-45	14-9-47	273	25	6,915	5·82	402·90	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Travalgan Starbright 28th	Jersey	. .	16-4-45	3-7-47	273	17	7,311	5·36	391·98	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Valliere Marilyn	A.I.S.	.	14 7 45	26 5 47	273	10	9,570	4·03	385·84	M. L. House	Glanavon Ricardo (8116)
Denmark Golden Acette	Guernsey	12681	28 6-44	12-12-46	273	18·5	5,845	6·57	384·58	Denmark Research Station	Denmark Ace (5738)
Kapara Happy Days 3rd	Jersey	. .	9-7-45	6-8 47	273	19	7,167	5·32	381·67	D. Bradford	Congelin Mandarin (14542)
Eungella Marlene	Jersey	. .	1-4-45	28-4-47	273	15	6,915	5·34	369·15	D. G. Spark	Hopleand's Marinora's Star (20814)
Grassvale Buttercup 19th	Jersey	....	3-7-45	19-8-47	273	25·5	8,011	4·59	367·88	R. H. Rose & Son	Glen Iris Golden Oxford (12694)
Muresk Diadem	Guernsey	13924	7 5 44	2-11 46	273	25	6,915	5·31	367·22	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Montaro Princess	A.I.S.	. .	30-6 44	12-11-46	273	33	8,529	4·22	360·39	M. H. Montgomery	Glanavon Tudor (8123)
Kapara Sweet Briar	Jersey	. .	22 6 45	19 6-47	273	19	7,227	4·97	359·85	D. Bradford	Congelin Mandarin (14542)
Travalgan Lady Eion 29th	Jersey	. .	19-5-45	7-9 47	273	14	5,922	6·07	359·54	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Grassvale Northwood Maggie	Jersey	....	13-10-44	8-11-46	273	22·5	6,967	5·14	358·53	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Wooroloo Lulu	A.I.S.	....	14-10-44	25-10 46	273	30	8,250	4·34	358·37	Wooroloo Sanatorium Farm	Wooroloo Red Baron (6412)
Carydale Royal Joy	Jersey	....	22-3-45	30 3-47	273	12	5,346	6·60	352·94	G. Layman	Juadine Royal (20841)
Colmyn Julienne	Jersey	....	4-6 45	29-7 47	273	10·5	5,911	5·92	350·49	C. H. Ironmonger	Eungella Prince Starbright (19538)
Valliere Annette	A.I.S.	....	2 4-45	6-3-47	273	20	8,655	4·04	349·95	M. L. House	Valliere Skipton (7595)
Muresk Dixie	Guernsey	13927	21-7 45	12-6-47	273	18	6,744	5·15	347·06	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Wooroloo Heatherbell 3rd	A.I.S.	. .	5-10 44	25 10 46	273	33	8,259	4·10	346·52	Wooroloo Sanatorium Farm	Berry Rufus 2nd (6570)
Trelawney Lightly	Jersey	....	26 7-45	27 4-47	273	19	6,087	5·63	342·86	J. C. Bushell	Greenmount Golden Patch (19603)
Kapara Jolly Handsome 2nd	Jersey	....	7-7-45	5-6 47	273	17	6,441	5·28	340·64	D. Bradford	Congelin Washington (18426)
Kapara Sparkle's Lassie 4th	Jersey	....	12-7-45	14-7-47	273	18	6,564	5·14	337·52	D. Bradford	Congelin Washington (18426)
Claremont Belle 44th	A.I.S.	....	1 3 45	5-7-47	273	20	7,080	4·76	337·48	Claremont Hospital for Insane	Glanavan Dunster (6867)
Travalgan Lady Eion 30th	Jersey	....	21-6-45	26-6-47	273	15	6,005	5·60	336·75	W. H. & T. F. Robinson	Mornmoot Laver (17792)

Trelawney Radium Lassie	Jersey	....	1-8-45	20-5-47	273	17	4,791	6·97	334·30	J. C. Bushell	Greenmount Golden Patch (19603)
Glanavon Fairy 12th	A.I.S.	....	6-4-45	18-7-47	273	21	8,103	4·12	334·13	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Muresk Lady Ideal	Guernsey	13940	12-2-45	15-5-47	273	21	6,273	4·85	333·42	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Muresk Fay	Guernsey	13929	20-5-45	4-6-47	273	19	7,662	4·34	332·74	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Travalgan Starbright 30th....	Jersey	....	8-6-45	27-6-47	273	17	5,991	5·55	332·69	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Grassvale Lady Fowler 43rd....	Jersey	....	25-9-44	8-11-46	273	16	6,468	5·08	328·93	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Claremont Biddy 78th	A.I.S.	....	29-5-44	15-11-46	273	29·5	8,233	3·93	323·75	Claremont Hospital for Insane	Westby Monarch (5404)
Yalebra Roma	Jersey	....	19-7-45	30-4-47	273	17·5	6,382	5·02	320·50	K. V. Gray	Greenmount Golden Patch (19603)
Grassvale Nora's Beauty	Jersey	....	31-7-45	4-9-47	273	14	5,697	5·56	317·05	R. H. Rose & Son	Glen Iris Golden Oxford (12694)
Travalgan Starbright 29th	Jersey	....	22-5-45	9-7-47	273	15	5,565	5·68	316·34	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Grassvale Buttercup 18th	Jersey	....	5-11-44	2-2-47	273	16·5	5,869	5·36	314·68	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Wooroloo Model 2nd	A.I.S.	....	26-6-44	19-10-46	273	19	7,407	4·20	311·58	Wooroloo Sanatorium Farm	Berry Rufus 2nd (6570)
Grassvale Golden Cream 27th	Jersey	....	26-9-44	1-2-47	273	12·5	6,007	5·15	309·45	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Radyr Park Dorothy 34th	Jersey	....	21-6-45	17-8-47	273	17	5,766	5·32	306·91	L. M. Temple	Radyr Park Estralita 2nd Starlight (21187)
Travalgan Starbright 31st	Jersey	....	12-6-45	15-7-47	273	13	5,139	5·93	305·05	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Claremont Cherry 39th	A.I.S.	....	15-10-44	15-8-47	273	19	7,062	4·25	300·42	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Pinafore 21st	A.I.S.	....	1-1-45	26-4-47	273	23	7,779	3·85	300·09	Claremont Hospital for Insane	Westby Monarch (5404)
Korijekup Lilian	Jersey	....	3-6-45	26-8-47	273	11	4,398	6·81	299·79	Mrs A. G. Eckersley	Navua Royal Star (15869)
Claremont Belle 43rd	A.I.S.	....	19-10-44	18-1-47	273	22·5	7,477	3·97	297·27	Claremont Hospital for Insane	Westby Masterpiece (5403)
Claremont Cleggett 28th	A.I.S.	....	16-8-44	27-10-46	273	24·5	7,228	4·10	296·67	Claremont Hospital for Insane	Westby Masterpiece (5403)
Plenarbor Lovely	A.I.S.	....	14-4-44	30-8-47	273	23	7,299	4·06	296·12	Mrs. V. Alexander	Glanavan Genius (3957)
Durrinba Temple Belle	Jersey	....	24-8-45	30-5-47	273	13	5,304	5·56	295·38	F. Campbell	Radyr Park September Lad (14023)
Yalebra Lady	Jersey	....	15-8-45	6-9-47	273	9	5,337	5·53	295·21	K. V. Gray	Mokine Reserve (21017)
Claremont Clara 24th	A.I.S.	....	13-8-44	30-10-46	273	22·5	7,012	4·18	293·40	Claremont Hospital for Insane	Claremont Vincent (6715)
Claremont Maggie Morrison 63rd	A.I.S.	....	15-10-44	16-8-47	273	23	7,404	3·94	291·86	Claremont Hospital for Insane	Westby Masterpiece (5403)
Claremont Biddy 81st	A.I.S.	....	11-10-44	14-4-47	273	23	7,719	3·77	291·52	Claremont Hospital for Insane	Westy Monarch (5404)
Mereworth Dreaming Fondant	Jersey	....	31-5-44	9-6-47	273	8·5	5,875	4·92	289·41	B. Langridge	Navua Coronation Star (14929)
Glanavon Penelope 4th	A.I.S.	....	11-11-44	14-2-47	273	24	6,912	4·15	287·00	D. Bevan & Sons	Glanavon Fairy's Triumph (8105)
Grassvale Design's Magnolia	Jersey	....	5-11-44	22-10-46	273	12	5,541	5·16	286·23	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Muresk June	Guernsey	13938	9-8-45	1-6-47	273	16·5	6,544	4·36	285·44	J. R. Giles	Koojan Ideal's Dictator (4167)
					365	13·5	7,927	4·58	363·08		
Wattle Hill Cinderella	A.I.S.	....	12-4-45	29-8-47	273	18	6,729	4·23	285·25	K. Prowse	Capel Cinderella King 2nd (7892)
Muresk Adeline	Guernsey	13919	7-9-44	25-11-46	273	25	6,480	4·38	284·11	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Glanavon Rene 4th	A.I.S.	....	27-10-44	26-3-47	273	22	7,386	3·84	283·60	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Kapara Carnation	Jersey	....	7-6-45	20-6-47	273	14	5,562	5·08	282·54	D. Bradford	Congelin Mandarin (14542)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS UNDER 2½ YEARS OLD. STANDARD 230 LB. BUTTERFAT.											
Camden Sheba	Jersey		5-2-45	23-7-47	273	10	4,620	6·08	281·75	C. E. Kruger	Greenmount Starbright (20748)
Glanavon Glenys 5th	A.I.S. ...		9-9-44	5-2-47	273	21	6,963	4·04	281·62	D. Bevan & Sons	Blackland's Jean's Supreme (1871)
Walgett Joyce	Jersey ...		28-6-45	30-8-47	273	11·5	5,029	5·59	280·99	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Claremont Cherry 38th	A.I.S. ...		9-7-44	6-11-46	273	24	7,512	3·73	280·54	Claremont Hospital for Insane	Westby Masterpiece (5403)
Glanavon Ettie 11th ...	do. .		10-2-45	5-7-47	273	14	6,642	4·21	279·90	D. Bevan & Sons	Blackland's Monarch Commander (1877)
Eungella Little Gem	Jersey ...		22-5-45	25-4-47	273	12	5,181	5·39	279·58	D. G. Spark	Hopeland's Marinora Star (20814)
Claremont Whitby Maiden 4th	A.I.S. ..		7-1-45	16-4-47	273	22·5	6,727	4·13	277·85	Claremont Hospital for Insane	Glanavon Dunster (4867)
Walgett Tudor Rose	Jersey ...		17-4-45	8-5-47	273	11·5	5,164	5·36	277·02	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Claremont Maggie 22nd	A.I.S.		30-9-44	12-11-46	273	21	6,723	4·10	276·17	Claremont Hospital for Insane	Glanavon Dunster (4867)
Denmark Rosemary 2nd ...	Guernsey	12702	14-10-44	2-12-46	273	14·5	4,483	6·13	275·06	Denmark Research Station	Koojan Ideal's Reflection (4974)
Radyr Park Dorothy 33rd....	Jersey		10-6-45	1-8-47	273	9	5,127	5·35	274·59	L. M. Temple	Radyr Park Estrellita 2nd Starlight (21187)
Kapara Duchess 3rd	do.		27-6-45	6-6-47	273	14	5,097	5·38	274·34	D. Bradford	Congelin Washington (18426)
Eungella Miss Marinora	do.		15-6-45	9-5-47	273	10·5	5,056	5·39	272·58	D. G. Spark	Hopelands' Marinora's Star (20814)
Claremont Whitby Maid 60th	A.I.S.		13-8-44	6-11-46	273	22	6,906	3·94	272·15	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Maggie Morrison 66th	do.		23-12-44	23-2-47	273	24	6,957	3·89	270·91	Claremont Hospital for Insane	Westby Monarch (5404)
Eungella Crystal Lily	Jersey		4-4-45	23-7-47	240	11	5,250	5·15	270·48	D. G. Spark	Hopeland's Marinora's Star (20814)
Tipperary Tulip	A.I.S.		2-11-45	14-9-47	273	20	6,630	4·06	269·19	W. G. Burges	Tipperary Performer (7572)
Claremont Maggie Morrison 56th	do.		15-12-44	23-2-47	273	21	7,203	3·72	268·06	Claremont Hospital for for Insane	Westby Masterpiece (5403)
Travalgan Lady Eion 33rd	Jersey		6-10-45	11-8-47	273	11	4,983	5·31	264·80	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Radyr Park Dorothy 32nd	do.		1-5-45	8-6-47	273	10	4,740	5·56	263·62	L. M. Temple	Radyr Park Estrellita 2nd Starlight (21187)
Claremont Mabel 33rd	A.I.S.		18-12-45	4-8-47	273	20	6,930	3·80	263·50	Claremont Hospital for Insane	Glanavon Dunster (6867)
Claremont Mavis 11th	do.		12-9-44	25-10-46	273	18	6,729	3·88	261·66	Claremont Hospital for Insane	Westby Masterpiece (5403)
Glanavon Charmer 5th	do.		30-10-44	5-2-47	273	22	5,841	4·43	259·17	D. H. Bell	Blackland's Jean's Supreme (1871)
Claremont Biddy 84th	do.		15-12-44	20-4-47	273	15	6,030	4·28	258·55	Claremont Hospital for Insane	Westy Monarch (5404)
Glanavon Rosette 7th	do.		9-9-44	10-2-47	273	16	5,898	4·38	258·39	D. Bevan & Son	Glanavon Fairy's Triumph (8105)
Tipperary Beauty 22nd	do.		19-12-44	15-3-47	273	17	6,291	4·09	257·78	W. G. Burges	Liberton Venturer 2nd (7132)
Travalgan Lady Eion 28th	Jersey ...		18-5-45	21-6-47	273	13	4,689	5·47	256·95	W. H. & T. F. Robinson	Mornmoot Laver (17792)

Walgett Easter Tulip	do.	....	8-4-45	16-6-47	273	9	5,262	4·88	256·85	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Travalgan Lady Eion 34th	do.	....	7-10-45	1-8-47	273	7	4,161	6·15	256·01	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Claremont Cherry 41st	A.I.S.	....	14-12-44	24-1-47	273	21	6,363	4·01	255·39	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Blossom 44th	do.	....	16-11-45	20-4-47	273	18·5	6,595	3·84	253·42	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Beauty 31st	do.	....	19-10-44	21-1-47	273	21·5	7,069	3·56	252·31	Claremont Hospital for Insane	Glanavon Dunster (6867)
Eungella Jessamine	Jersey	....	12 5-45	22-4-47	273	11	5,073	4·94	251·08	D. G. Spark	Hopeland's Marinora's Star (20814)
Claremont Maggie 20th	A.I.S.	....	17-7-44	5-11-46	273	22·5	6,667	3·73	249·00	Claremont Hospital for Insane	Westby Masterpiece (5403)
Glanavon Melba 8th	do.	....	12-4-45	26 7-47	273	11	6,213	4·00	248·85	D. Bevan & Sons	Glanavon Fairy's Triumph (8105)
Claremont Pinafore 20th	do.	....	6-9-44	16-11-46	273	21	6,468	3·82	247·22	Claremont Hospital for Insane	Westby Masterpiece (5403)
Tipperary Lovely 11th	do.	....	2-6-45	17-3-47	273	11	6,183	3·97	245·48	W. G. Burges	Tipperary Ace (6336)
Claremont Cherry 44th ..	do.	....	4-5-45	30-7 47	273	16	6,243	3·92	244·76	Claremont Hospital for Insane	Westby Monarch (5404)
Kiama Bess 20th	do.	....	11 4-45	25-5-47	273	13	6,009	4·03	242·35	M. H. Montgomery	Kiama Ronel (7079)
Carbanup Helen	do.	....	7-3 45	30 3 47	240	30·5	7,125	3·39	242·13	D. H. Bell	Newstead Royal Sun (7252)
Denmark Standard's Dawn	Guernsey	12704	28-9-46	9-12-46	273	12	3,516	6·84	240·74	Denmark Research Station	Denmark Valencia's Standard (5767)
Eungella Pepita	Jersey	....	28-6-45	29 4 47	273	11	4,533	5·28	239·55	D. G. Spark	Hopeland's Marinora's Star (20814)
Montaro Empress	A.I.S.	52251	18 2-45	15-5-47	240	17	5,325	4·49	239·43	J. H. Bensted & Co.	Glanavon Tudor (8123)
Walgett Handsome Girl 41st	Jersey	....	4-8-45	18-8-47	273	12·5	4,747	5·04	239·32	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Radyr Park Estrellita 6th	do.	....	1-10-45	12-7-47	273	8	3,744	6·32	236·96	L. M. Temple	Radyr Park September Lad (825)
Claremont Star 35th	A.I.S.	....	6-11-44	25-1-47	273	18	6,159	3·79	233·74	Claremont Hospital for Insane	Westby Masterpiece (5403)
Mayvale Discoverer's Bluebell 3rd	Guernsey	13659	28-7-44	25-11-46	273	7·5	4,537	5·11	232·29	R. J. Giles	Koojan Ideal's Discoverer (4968)
Carbanup Heiress	A.I.S.	....	10-3-45	8-4-47	240	25·5	6,470	3·52	231·84	D. H. Bell	Newstead Royal Sun (7252)
Claremont Whitby Maid 62nd	do.	....	2-4 45	7-8-47	273	15	6,375	3·62	230·67	Claremont Hospital for Insane	Glanavon Dunster (6867)
Radyr Park Estrella	Jersey	....	23 6-45	22-7-47	273	7	4,116	5·56	228·90	L. M. Temple	Radyr Park Estrellita 2nd's Starlight (21187)
Claremont Hilda 19th	A.I.S.	....	22 3-45	5-7-47	273	16	6,318	3·62	228·80	Claremont Hospital for Insane	Westby Masterpiece (5403)
Claremont Maggie Morrison 69th	do.	....	1-2-45	5-7-47	273	13	5,574	4·08	227·47	Claremont Hospital for Insane	Westby Masterpiece (5403)
Rosella Twinkle	Guernsey	14413	5-6-45	22 7 47	210	7	4,935	4·57	225·96	Darnell Brothers	Cranbourne Charlie (3993)
Kapara Rosebud 3rd	Jersey	....	2-8-45	23-6-47	273	7	4,011	5·68	225·82	D. Bradford	Grassvale Twylish Lad (21816)
Wondella Fleur 6th	do.	....	24-10-45	17-8-47	273	12	4,671	4·83	225·81	B. C. H. Hack	Kapara Jolly Roger
Kapara Peerless Lily	do.	....	31-3-45	13-6-47	273	10	4,350	5·18	225·33	D. Bradford	Congelin Mandarin (14542)
Radyr Park October Star 3rd	do.	....	23-7-45	18-8-47	273	6	4,158	5·36	222·85	L. M. Temple	Radyr Park Estrellita 2nd Starlight (21187)
Claremont Whitby Maid 61st	A.I.S.	....	23-12-44	23-6-47	273	14	6,207	3·58	222·51	Claremont Hospital for Insane	Westby Masterpiece (5403)
Rosella Twylight	Guernsey	14412	5-6-45	13-8-47	210	5·5	4,170	5·28	220·41	Darnell Brothers	Cranbourne Charlie (3993)
Rutherwood Annette	do.	14481	15-4-45	1-8-47	273	10	4,185	5·20	217·66	Misses E. & I. Rutherford	Koojan Ace's Sunshine (5942)
Narrogin Princess Pearl	A.I.S.	....	8-9-45	28-6-47	210	21·5	5,415	4·00	217·11	J. Bensted & Co.	Wooroloo Gay Gordon (8878)
Lenmoor's Maggie 2nd	do.	....	10-9-45	23-8-47	240	8	5,145	4·14	213·49	G. W. Marston	Wooroloo Union Jack (7662)
Carbanup Honey	do.	....	21 2-45	8-4-47	240	22·5	5,745	3·67	211·14	D. H. Bell	Newstead Royal Sun (7252)

TABLE 9—HERD TESTING *continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS UNDER 2½ YEARS OLD. STANDARD 230 LBS. BUTTERFAT.											
Tipperary Topsy	A.I.S.	...	14-11-45	3-9-47	273	12	4,936	4·22	210·25	W. G. Burges	Tipperary Performer (7572)
Denmark Golden Dawn 3rd	Guernsey	12682	29-9-44	10 12-46	273	9	3,747	5·59	209·54	Denmark Research Station	Koojan Ideal's Reflection (4974)
Tipperary Lovely 10th	A.I.S.	....	18-11 44	16 1-47	273	7	4,851	4·21	204·41	W. G. Burges	Liberton Venturer 2nd (7132)
Plenarbor Tottie	do.	..	26 5 44	15-11-46	273	22	5,091	3·99	203·13	Mrs. V. Alexander	Glanavon Genius (3957)
Wykeham Heroine	Jersey	..	31 8 45	27-6-47	210	12	4,155	4·84	201·36	K. V. Gray	Wykeham Gentle Lad (22508)
Tipperary Milkmaid	A.I.S.	....	23 11-45	21-9-47	240	18	5,070	3·92	198·95	W. G. Burges	Glanavon Povey (8114)
Claremont Clarie 5th	do.	..	25 12-44	12-6-47	273	17	5,391	3·68	198·56	Claremont Hospital for Insane	Westby Masterpiece (5403)
Narrogin Dixie	do.	....	10 1-45	20-3-47	273	12	4,881	4·04	197·58	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Tipperary Lovely 9th	do.	..	15 11-44	19 2-47	273	8	4,734	4·05	192·13	W. G. Burges	Liberton Venturer 2nd (7132)
Colliedale Biddy	Jersey	.	20-6 44	17 12 46	273	15·5	3,331	5·72	190·86	C. E. Kruger	Belgonia Peggy 6th's Aim (17263)
Rosella Daphne	Guernsey	14393	16-4-45	15-5 47	273	10	4,065	4·67	189·94	Darnell Brothers	Cranbourne Charlie (3993)
Narrogin Pamela	A.I.S.	....	9 2-45	17-5-47	273	9	4,737	3·99	189·32	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Narrogin Dolores	do.	..	12-5-45	30-3-47	273	11	4,698	4·02	189·13	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Glanavon Charmer 6th	do.	..	4-1 45	28-2-47	273	11	4,653	3·97	185·13	D. Bevan & Sons	Glanavon Fairy's Triumph (8105)
Rosella Opal	Guernsey	14402	26 7-45	23-8-47	180	9	3,630	5·07	184·29	Darnell Brothers	Cranbourne Charlie (3993)
Claremont Cleggett 29th	A.I.S.	....	7-3-45	4-8-47	210	18	4,830	3·79	183·18	Claremont Hospital for Insane	Glanavon Dunster (6867)
Radford Park Daisy	Jersey	....	28-5-45	17-8-47	180	10·5	4,500	4·06	182·70	Radford Park Company	Grassvale Golden Lad (19599)
Rutherwood Golden Twylight 2nd	Guernsey	14493	7-7 45	13-8 47	273	7	4,101	4·41	181·04	Misses E. & I. Rutherford	Rutherwood Golden Ideal (7971)
Glanavon Ettie 10th	A.I.S.	....	21 6-45	6 3-47	240	6	4,380	4·10	179·91	D. Bevan & Sons	Glanavon Fairy's Triumph (8105)
Rosella Heather	Guernsey	14396	18-6-45	24-5-47	240	6	3,705	4·81	178·35	Darnell Brothers	Cranbourne Charlie (3993)
Claremont Empress	A.I.S.	....	30-8-45	23-8-47	180	13	4,290	4·13	177·18	W. K. Barnes	Capel Monarch (7898)
Rosella Marigold	Guernsey	14399	9-6-45	7 8-47	210	5·5	3,315	5·31	176·25	Darnell Brothers	Cranbourne Charlie (3993)
Narrogin Lilac	A.I.S.	....	18-4-45	6-4-47	273	12	4,461	3·86	172·54	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Narrogin Mignon	A.I.S.	....	21-4-45	11 4-47	273	12	4,416	3·86	170·52	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Narrogin Mary	do.	....	31 3-45	20-3-47	273	12	4,476	3·72	166·74	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Carbanup Handsome	do.	....	1-3-45	22-4-47	210	22	4,665	3·52	164·28	D. H. Bell	Newstead Royal Sun (7252)
Narrogin Marlene	do.	....	7-4-45	20 3-47	273	10	3,945	3·84	151·78	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Narrogin Sadie	do.	....	13-4-45	23-3-47	273	9	3,702	4·02	149·18	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Wondella Annette	Jersey	....	15-11-45	25 8-47	210	5	2,835	5·09	144·33	B. C. H. Hack	Burlington Sultan (21613)
Narrogin Gem	A.I.S.	....	19-4-45	13-5-47	210	12	3,600	3·92	141·33	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)

Kapara Iolanthe 2nd	Jersey	....	12–7–45	14–7–47	150	13	2,490	5·6	140·19	D. Bradford	Congelin Mandarin (14542)
Mokine Empire's Lily 44th	do.	....	18–7–45	29–9–47	150	8·5	2,340	5·90	139·17	Davies & Sons ..	Mokine Reserve (21017)
Koojan Benoit's Jocelyn	Guernsey	.	18 12 45	5–10–47	180	9.5	2,490	5.45	135.93	R. J. Giles . .	Road's End Benoit (5211)
Rosella Token	do.	14410	8 8 45	27–9–47	150	7	3,060	4.32	132.24	Darnell Brothers	Cranbourne Charlie (3993)
Grassvale Golden Cream 29th	Jersey	..	15 8 45	29–8 47	120	19	2,730	4.81	131.55	K. V. Gray . .	Glen Iris Golden Oxford (12694)
Mokine Empire's Twylish 19th	do.	..	16–4–46	13–9–47	120	17	2,070	5.38	111.48	T. H. Wilding	Mokine Reserve (21017)
Yokanup Pansy 6th	A.I.S.	.	9–6–45	18–9–47	150	13	2,580	3.87	99.96	Burkitt & Brown ...	Glanavon Romancer (6878)
Yokanup Carnation 8th ..	do.	..	2–9–45	18–9–47	120	12	2,130	4.56	97.26	Burkitt & Brown ...	Glanavon Romancer (6878)
Travalgan Attraction	Jersey	....	1 8 45	25–11–47	60	26	1,590	6.09	96.96	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Wondella Butterfly 5th	do.	....	12–7–45	29–12–47	150	9	1,950	4.77	93.12	B. C. H. Hack	Kapara Jolly Roger
Denmark Reflection's Petal....	Guernsey	12696	26–8 45	16 10 47	150	8.5	2,085	4.24	88.50	Denmark Research Station	Koojan Ideal's Reflection (4974)
Lansdowne Beaux Yeux	do.	....	20–12–44	17 6–47	90	21	1,920	4.14	79.62	J. R. Giles	Koojan Beau Ideal (4965)
Narrogin Dewdrop	A.I.S.	..	12 3 45	25–3–47	150	7	1,635	4.28	70.05	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Bindoon Brenda . . .	do.	....	22–12–45	15 12 47	180	6	1,710	4.04	69.12	Christian Bros. Farm School	Emerald Vale Speculation (8032)
Granada Countess 17th ..	Jersey	...	6 8 45	5 6–47	60	22.5	1,305	5.16	67.44	R. G. Brazier	Austral Park Pioneer (16264)
Narrogin Astrid	A.I.S.	..	2–6–45	15–3–47	150	7	2,100	3.13	65.76	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Narrogin Charity .	do.	....	11·5 45	27·3 47	120	7	1,440	3.84	55.35	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Rosella Sunbeam	Guernsey	14409	10 9 45	14–9–47	90	9	1,080	4 87	52.65	Darnell Brothers	Cranbourne Charlie (3993)
Narrogin Dawn	A.I.S.		3 4 46	22 2 48	60	19	1,410	3.68	52.02	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Granada Leticia 15th ...	Jersey	.	6 8 45	19 5 47	30	27	810	6.23	50.49	R. G. Brazier	Belgonia Royal Pride (21526)
Wondella Beauty	do.	....	18 8 45	12–8–47	90	6	1,140	4.16	47.49	B. C. H. Hack	Burlington Sultan (21613)
Rosella Sunlady	Guernsey	....	14 7 46	26 2 48	90	11.5	1,035	4.51	46.74	Darnell Brothers .	Koojan Ace's Roosevelt (7439)
Drakesbrook Kidlet . .	do.	12755	29 4 45	13 10 47	30	18.5	555	4.48	24.87	R. J. Giles	Koojan Ace's Aviator (5930)
Narrogin Dorcas	A.I.S.		6 5 45	24 5 47	60	5	510	4.62	23.58	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Kapara Dairymaid 4th	Jersey		15–6–46	2 4–48	30	10.5	315	4.45	14.04	W. L. Bradford .	Grassvale Twylish Lad (21816)

COWS 2½ YEARS AND UNDER 3 YEARS. STANDARD 250 LB. BUTTERFAT.

Grassvale Buttercup 17th . .	Jersey	....	1 10 44	5–5–47	273	26.5	9,394	5.22	490.86	R. H. Rose & Son ...	Mornmoot Northwood Beau (17798)
Denmark Ace's Velvet	Guernsey	12672	3 9 44	7–6 47	273	20	7,545	5.97	450.16	Denmark Research Station	Denmark Ace (5738)
Muresk Helianthus	do.	13933	9 12 44	22 6 47	273	26	8,598	5.22	449.60	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Capel Model 10th .	A.I.S.	.	9 5–44	6 5–47	273	29	11,157	3.93	439.25	B. W. Prowse	Capel Star King (4672)
Mokine Daisy 4th .	Jersey		24 10 44	10–9–47	273	19	7,407	5.84	432.75	T. H. Wilding .	Mokine Reserve (21017)
Koojan Ace's Juliette	Guernsey	13501	29 5 44	8–12 46	273	20	8,130	5.24	426.58	R. J. Giles	Homestead Ace (1631)
Grassvale Northwood Maggie	Jersey		13–10–44	5 10 47	273	13	7,674	5.41	415.66	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Denmark Ace's Dawn 3rd .	Guernsey	12671	22–10–44	23 5–47	273	15	6,975	5.95	415.04	Denmark Research Station	Denmark Ace (5738)
Tipperary Beauty 23rd .	A.I.S.	....	6 1 45	14–9–47	273	30	10,560	3.91	413.45	W. G. Burges ...	Liberton Venturer 2nd (7132)
Capel Model 11th	do.		13 8 44	22 4 47	273	29	10,482	3.63	380.74	B. W. Prowse	Capel Rose's Commodore (6692)
Clovelly Blossom 2nd	Guernsey	12599	4–8–44	23 6 47	273	12	6,351	5.86	372.25	J. Cabassi .	Denmark Rosa's Ace (5760)
Koojan Ace's Jane .	do.	13493	5–7–44	12 4–47	273	14	6,402	5.67	363.49	A. W. Padbury .	Homestead Ace (Imp.) (1631)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 2½ YEARS AND UNDER 3 YEARS. STANDARD 250 LB. BUTTERFAT.											
Valliere Viola	A.I.S.	....	7-7-44	7-6-47	240	15	8,040	4.43	356.13	M. L. House	Valliere Warrior (8816)
Camden Cleopatra 2nd	Jersey	....	20-8-44	1-6-47	273	15	5,475	6.44	352 66	C. E. Kruger	Greenmount's Starbright (20748)
Burlington Dairymaid 3rd	do.	....	1-9-44	15-6-47	273	12.5	6,262	5.52	345.95	Davies & Sons	Lawrenny Johnnie (16670)
Chillwell Zena's Buttercup	do.	...	14-8-44	11-4-47	273	14.5	6,193	5.50	341.23	Mrs. M. A. Watson	Grassvale Noramine's Beau (19600)
Capel Daphne's Pet	A.I.S.	....	10-9-44	28-7-47	273	23.5	9,160	3.68	337.16	B. W. Prowse	Capel Dove King (5579)
Yokanup Pansy 4th ...	do.	....	31-7-44	25-5-47	273	17	8,661	3.85	333 57	Burkitt & Brown	Glanavon Romancer (6878)
Muresk Waaf	Guernsey	13951	17-4-44	17-12-46	273	25	7,095	4.46	316.69	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Muresk Amethyst	do.	13920	21-7-44	11-6-47	273	17	6,426	4.86	312.16	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Glanavon Dell 7th	A.I.S.	....	12-8-44	12-6-47	273	14	7,212	4.28	311.07	D. Bevan & Sons	Blackland's Monarch's Commander (1877)
Muresk Rona	Guernsey	13946	9-6-44	15-1-47	273	16	7,008	4.40	308.74	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Grassvale Lady Fowler 41st	Jersey	....	3-4-44	8-11-46	273	11	5,748	5.35	307.65	K. V. Gray	Mornmoot Northwood Beau (17798)
Eungella Yileen	do.	....	27-4-44	27-4-47	273	14	7,152	4.27	305.61	D. G. Spark	Eungella Prince Starbright (19538)
Montaro Pansy	A.I.S.	....	14-2-45	22-8-47	273	17	6,891	4.35	299.81	M. H. Montgomery	Glanavon Tudor (8123)
Kapara Duchess 2nd	Jersey	....	18-6 44	3-5-47	273	18	5.874	5.10	299.69	W. L. Bradford	Congelin Jolly Eminent 3rd (18425)
Chillwell Godetia Gwen	do.	....	19-12-44	12-9-47	273	9.5	6,758	4.38	291.16	Mrs. M. A. Watson	Grassvale Noramine's Beau (19600)
Lenmoor's Della 5th	A.I.S.	....	14 8-44	28-7 47	273	5.5	6,496	4.40	286.41	G. W. Marston	Ferndale Radiant (5729)
Alne-Bank Fairy 36th	do.	...	9 12-44	26-6-47	273	15.5	6,946	4.11	285.43	G. W. Marston	Parkview Factor (5107)
Burlington Sweet Wonder	Jersey	...	21-8-44	4-5-47	240	11.5	4,575	6.12	280.02	Davies & Sons	Lawrenny Johnnie (16670)
Grassvale Lady Fowler 42nd	do.	....	27-8 44	24-7 47	210	11.5	4,845	5.56	269.82	K. V. Gray	Mornmoot Northwood Beau (17798)
Juadine Peerless Lily 24th	do.	....	18-5-44	15-1-47	273	16.5	4,759	5.58	265.72	K. V. Gray	Juadine Northwood Beau (19670)
Claremont Beauty 30th	A.I.S.	....	30-9-44	19-4-47	273	23	6,969	3.79	264.43	Claremont Hospital for Insane	Westby Monarch (5404)
Kapara Firefly 2nd ...	Jersey	....	5-8-44	2-5-47	273	13	5,814	4.53	263.92	W. L. Bradford	Congelin Mandarin (14542)
Glanavon Doris 20th	A.I.S.	....	20-1-45	13-8-47	273	14	6,252	4.21	263.22	D. Bevan & Sons	Glanavon Fairy Triumph (8105)
Glanavon Melba 7th ...	do.	....	31-5-44	25-3-47	273	25.5	7,306	3.60	263.18	D. H. Bell	Newstead Triumph (3420)
Claremont Biddy 83rd ...	do.	....	5-12-44	5-7-47	273	21	7,128	3.58	255.26	Claremont Hospital for Insane	Westby Monarch (5404)
Kapara Rose Bud 2nd	Jersey	....	28-5-44	26-5-47	273	6	4,563	5.59	255.24	W. L. Bradford	Congelin Jolly Eminent 3rd (18425)
Yokanup Pearl 2nd	A.I.S.	....	16-10 44	24-9-47	273	19	6,882	3.70	255.18	Burkitt & Brown	Parkview Commodore (306)
Plenarbor Graceful	do.	....	30-6-44	15-5-47	273	17.5	6,922	3.60	249.36	Mrs. V. Alexander	Glanavon Genius (3957)
Juadine March Flower 3rd ..	Jersey	....	5-11-44	15-7-47	240	4.5	4,935	4.94	243.99	Davies & Sons ...	Juadine Northwood Beau (19670)
Denmark Reflection's Dame 2nd	Guernsey	12694	25-9-44	31-5-47	273	10	4,590	5.27	241.95	Denmark Research Station	Koojan Ideal's Reflection (4974)
Montaro Fairy	A.I.S.	....	14-1-45	23-8-47	273	9	5,427	4.35	236.35	M. H. Montgomery	Glanavon Tudor (8123)
Mereworth Easter Rye 2nd ...	Jersey	.	21-12-44	30-8-47	240	6.5	4,260	5.27	224.76	B. Langridge	Navua Coronation Star (14929)
Rosella Gloria	Guernsey	14395	2-11-44	2-10-47	210	4	4,335	5.10	221.37	Darnell Brothers	Cranbourne Charlie (3993)
Kapara Sparkle's Victorious 2nd	Jersey	...	29 5-44	28-4-47	273	9.5	4,573	4.79	219.19	W. L. Bradford	Congelin Jolly Eminent 3rd (18425)

Rosalind Janet 8th	A.I.S.	....	15–10–44	2–9–47	273	8	5,349	4.08	218.28	W. K. Barnes	Wallatin Dandy (6370)
Yokanup Pansy 5th	do.	....	5–9–44	31–5–47	273	12.5	6,172	3.51	216.80	Burkitt & Brown	Parkview Commodore (306)
Newstead Rapture 28th ..	do.	....	20–4–44	30–3–47	240	20.5	6,315	3.32	209.67	D. H. Bell	Newstead Dictator (6025)
Radford Park Boronia	Jersey	....	20–9–44	20–6–47	210	10	4,125	5.06	208.98	Radford Park Co.	Grassvale Golden Lad (19599)
Rutherwood Golden Beauty	Guernsey	14486	28–12–43	20–11–46	273	11.5	4,219	4.92	207.81	Misses E. & I. Rutherford	Denmark Golden Rippler (5751)
Kapara Sparkle's Lassie 3rd	Jersey	.. ..	13–8–44	9–7–47	240	7.5	4,710	4.40	207.54	W. L. Bradford	Congelin Jolly Eminent 3rd (18425)
Narrogin Damsel	A.I.S.	.. ..	7–6 44	26–3–47	273	10	5,190	3.96	206.02	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Rosella Daffodil . .	Guernsey	14392	7–8–44	22–7–47	210	7	3,705	5.54	205.32	Darnell Brothers	Cranbourne Charlie (3993)
Plenarbor Pearl	A.I.S.	....	6–5 44	30–12–46	273	24.5	6,073	3.37	205.13	Mrs. V. Alexander	Glanavon Chief (6864)
Chillwell Julienne's Lily	Jersey	....	2–9–44	21–5–47	240	12	4,245	4.50	191.37	Mrs. M. A. Watson	Juadine Northwood Beau (19670)
Rosella Matilda	Guernsey	14400	23–9 44	24–7–47	210	6	3,705	5.04	186.99	Darnell Brothers	Cranbourne Charlie (3993)
Radyr Park Dorothy 31st	Jersey	....	7–12–44	5–9–47	240	8	3,660	5.02	183.99	L. M. Temple	Radyr Park Estrellita 2nd Starlight (21187)
Plenarbor Daisy 2nd ..	A.I.S.	....	5–3–44	4–1–47	273	20	5,175	3.52	181.27	Mrs. V. Alexander	Glanavon Genius (3957)
Montaro Dove	do.	.. ..	15–3–44	15 1–47	180	27	4,770	3.72	177.69	M. H. Montgomery	Glanavon Vim (6882)
Newstead Lovely 28th ...	do.	.. ..	28–8–44	10–8–47	120	34.5	4,605	3.82	176.25	D. H. Bell	Newstead Radiant (8477)
Mereworth Oxford Marina	Jersey	.. ..	20–9–44	28–7–47	273	3.5	4,315	4.54	175.29	B. Langridge	Mereworth Easter Oxford (22023)
Trelawney Flash	do.	....	15–8–44	15–4–47	210	13	3,330	5.08	169.17	F. Campbell	Greenmount Golden Patch (19603)
Granada Primrose 2nd	do.	.. ..	20–9–44	5 6–47	150	20.5	3,420	4.71	161.10	R. G. Brazier	Austral Park Pioneer (16264)
Tipperary Lovely 11th ...	A.I.S.	....	2–6–45	13–1–48	120	15	3,780	3.65	138.09	W. G. Burges	Tipperary Ace (6336)
Bindoon Flossette	do.	....	18–10–44	22–10–47	240	9	3,495	3.79	132.54	St. Joseph's Farm School	Wooroloo Freddie (8876)
Wattle Creek Pretty	do.	....	6–5–44	20–2–47	120	25	3,000	4.30	129.03	E. T. Thatcher	Glanavon Duncan (6866)
Rosella Wallflower	Guernsey	14414	9–9–44	5–9–47	180	5.5	2,790	4.60	128.49	Darnell Brothers ..	Cranbourne Charlie (3993)
Capel Pretty Vision 2nd	A.I.S.	....	14–6–44	28–4–47	90	21	2,055	4.11	84.57	B. W. Prowse	Capel Rose's Commodore (6692)
Chillwell Hovea Madeira	Jersey	....	29–10–44	16–5–47	90	16	1,500	4.65	69.84	Mrs. M. A. Watson ...	Grassvale Noramine's Beau (19611)
Travalgan Lady Eion 28th	do.	....	18–5–45	17–5–48	30	26	780	5.44	42.48	W. H. & T. F. Robinson	Mornmoot Laver (17792)
Capel Empress 2nd	A.I.S.	....	10–7–44	3–6–47	30	30	900	4.06	36.60	B. W. Prowse	Capel Rose's Commodore (6692)
Narrogin Sadie	do.	.. ..	13–4–45	1–3–48	30	23	690	3.86	26.64	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)
Narrogin Gem	do.	....	19–4–45	27–2–48	30	24	720	3.05	21.96	Narrogin School of Agriculture	Wooroloo Gay Gordon (8878)

COWS 3 YEARS AND UNDER 3½ YEARS STANDARD 270 LB. BUTTERFAT.

Juadine Peerless Lily 23rd	Jersey	....	27–4–44	8–8–47	273	23	9,329	5.90	551.27	M. B. Stott	Juadine Northwood Beau (19670)
Denmark Bonnie Marie ..	Guernsey	12675	30–11–43	2–6–47	273	14	8,022	5.56	446.74	Denmark Research Station	Denmark Marie's Ruler (5756)
Juadine Jewel 5th	Jersey	....	29–1–44	29–5–47	240	22	8,890	4.97	441.69	G. Layman	Juadine Northwood Beau (19670)
Carydale Royal Daisy	do.	758	4–3–44	24–6–47	210	19	6,120	6.97	426.90	G. Layman	Juadine Royal (20841)
Grayleigh Precious Gem 3rd	A.I.S.	....	29–9–43	17–1–47	273	34	10,902	3.89	424.19	W. G. Burges	Grayleigh Wooton (4016)
Capel Queen's Maid	do.	....	30–4–44	16–5–47	273	18	9,309	4.23	393.99	B. W. Prowse	Capel Star King (4672)
Mokine Empire's Twylish 17th	Jersey	....	10–4–44	19–6–47	273	20	6,150	6.24	383.51	T. H. Wilding	Mokine Triumph (21019)
Riverglen Clarabelle 67th	A.I.S.	....	17–4–44	1–5–47	273	23	9,069	4.20	381.76	M. H. Montgomery	Kiama Chief (4098)
Muresk Jessica	Guernsey	13935	26–7–44	1–10–47	273	19	7,797	4.78	373.07	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Valliere Dairymaid	A.I.S.	47673	8–4–44	22–6–47	210	25	9,540	3.91	363.60	J. Bensted & Co.	Valliere Skipton (7595)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 3 YEARS AND UNDER 3½ YEARS OLD—STANDARD 270 LB. BUTTERFAT.											
Juadine Julienne 4th	Jersey	....	28–5–44	28–7–47	273	10.5	6,601	5.47	361.59	K. V. Gray	Juadine Northwood Beau (19670)
Lenmoor's Red Queen	A.I.S.	....	18–8–43	1–10–46	273	26	8,868	4.01	356.44	G. W. Marston	Ferndale Radiant (5729)
					365	29	11,440	4.13	472.63		
Muresk Awas	Guernsey	13921	25–5–44	14–7–47	273	18	8,484	4.19	355.81	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Grassvale Silvermine 3rd	Jersey	.	15–10–43	22 10 46	273	8·5	6,055	5.84	353.63	R. H. Rose & Sons....	Mornmoot Northwood Beau (17798)
Wattle Hill Roan Queen	A.I.S.	....	6–5–44	17–5–47	273	26	8,778	4.00	351.63	K. Prowse	Wallatin Ninety Six (7607)
					365	20	10,615	4.05	430.40		
Radyr Park Dorothy 29th	Jersey	.	12 7 44	20 9–47	273	14	6,312	5.53	349.20	L. M. Temple	Radyr Park Estrellita 2nd Starlight (21187)
Muresk Veronica ..	Guernsey	13950	3 7 44	16 9–47	273	23	6,549	5.28	346.32	Muresk Agricultural College	Koojan Ideal's Dictator (4167
Kapara Dairymaid 2nd ..	Jersey		14 5 44	2–8 47	273	15·5	7,396	4.59	339.52	W. L. Bradford .	Congelin Jolly Eminent 3rd (18425)
Grassvale Magnolia 6th	do.		3 4 44	25 8–47	273	6	6,288	5.23	329.14	R. H. Rose & Sons	Mornmoot Northwood Beau (17798)
Mayvale Diana 2nd .	Guernsey	13657	9 8 43	28–10–46	273	17	6,621	4.91	325.72	R. J. Giles	Koojan Ideal's Discoverer (4968)
Denmark Ruler's Rose	do.	12703	5–1–44	23 5–47	273	13	6,519	4.94	322.57	Denmark Research Station	Denmark Marie's Ruler (5756)
Chillwell Model's Mignonette	Jersey		5 8 44	20 8–47	273	10.5	5,566	5.71	318.10	Mrs. M. A. Watson	Grassvale Noramine's Beau (19600)
Wattle Hill Princess	A.I.S.	....	20–5–44	23–9–47	273	21.5	8,854	3.55	314.37	K. Prowse	Wallatin Ninety Six (7607)
Valliere Valetta	do.	....	1–6–44	6–6–47	273	11	7,503	4.14	310.74	M. L. House	Valliere Warrior (8816)
Camden Venus 2nd	Jersey		20 4–44	3 6 47	273	11	5,418	5.71	309.84	C. E. Kruger ..	Greenmount Starbright (20748)
Colliedale Lass	do.	....	12–6–44	12–8–47	240	15	6,195	4.96	307.41	C. E. Kruger	Belgonia Peggy 6th Aim (17263)
Carbanup Grace .	A.I.S.	....	12–2–44	29 5 47	180	40.5	7,590	3.98	302.34	D. H. Bell . .	Glanavon Maestro (4833)
Grassvale Lady Fowler 41st	Jersey	.	3 4 44	25 9 47	240	7	5,580	5.27	294.54	K. V. Gray .	Mornmoot Northwood Beau (17798)
Camden Charmaine . .	do.		11 7 43	8–10 46	240	10	5,295	5.74	294.15	Mrs. A. G. Eckersley .	Greenmount Golden Bobbie (18578)
Trelawney Buttercup .	do.	.	10 5 43	22–10 46	273	12.5	4,717	6.21	293.32	K. V. Gray .	Greenmount Golden Patch (19603)
Lenmoor's Biddy 2nd ..	A.I.S.		7–7 44	4 10 47	240	11	7,380	3.81	281.24	G. W. Marston	Wooroloo Union Jack (7662)
Clovelly Diana	Guernsey	12603	15–5–44	25 5 47	273	15.5	6,241	4.45	277.77	J. Cabassi	Landsdowne Polydymite (4995)
Kapara Sparkle 4th . .	Jersey	....	15 4–44	16 6 47	273	6	5,673	4.85	274.85	D. Bradford . . .	Congelin Jolly Eminent 3rd (18425)
Mayvale Discoverer's Daffodil	Guernsey	...	20 1 44	1–7–47	273	6.5	4,324	6.33	273.65	R. J. Giles	Koojan Ideal's Discoverer (4968)
Yokanup Dahlia 2nd	A.I.S.	...	1 8 43	24–1–47	273	23	6,789	3.92	266.31	Burkitt & Brown	Parkview Commodore (306)
Tipperary Pretty Maid 3rd	do.	....	7–10–43	25–3–47	210	12	5,910	4.47	264.72	W. G .Burges	Tipperary Ace (6336)
Clovelly Twinkle	Guernsey	12620	30 4–44	19 5 47	273	15	5,010	5.19	260.22	J. R. Cabassi ..	Lansdowne Polydymite (4995)
Rutherwood Golden Dawn	do.	14488	15 4 44	29–8 47	273	11	5,328	4.86	256.08	Misses E. & I. Rutherford	Denmark Golden Rippler (5751)
Mereworth Winsome Starbright	Jersey	....	14–3–44	13–9–47	273	6.5	4,954	5.16	255.90	B. Langridge	Greenmount Starbright (20745)
Radyr Park Dorothy 27th....	do.	....	19–6–44	16–8–47	273	7	4,581	5.57	255.06	L. M. Temple .	Radyr Park Estrellita 2nd's Starlight (21187)
Radford Park Lily	do.	....	21–5–44	10–8–47	240	4	5,040	5.03	253.74	Radford Park Co. ..	Grassvale Golden Lad (19599)
Yokanup Lupin 3rd	A.I.S.	....	27 5 44	21–8 47	240	6	7,290	3.40	248.04	Burkitt & Brown	Parkview Commodore (306)
Emerald Vale Melba	do.	....	13–2–44	4–3–47	273	10	6,510	3.70	240.97	St. Joseph's Farm School	Scotch College Sir Nigel (8657)

Mereworth Coronation Vanilla	Jersey	....	22-3-44	30-4-47	273	11	4,788	5.02	240.81	B. Langridge	Navua Coronation Star (14929)
Kapara Valentine	do.	....	13-3-44	24-5-47	240	15	5,025	4.73	237.54	W. L. Bradford ...	Kapara Cream Sox (20860)
Kapara Bo-Peep 2nd .	do.	....	17-5-44	14-7-47	240	12	4,320	5.27	227.67	D. Bradford	Congelin Jolly Eminent 3rd (18425)
Plenarbor Opal .	A.I.S.	....	11-4-44	14-8-47	240	8.5	5,865	3.80	223.08	Mrs. V. Alexander	Glanavon Genius (3957)
Glanavon Rosette 6th ..	do.	..	19-2-44	15-6-47	273	11	5,103	4.28	218.60	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Yokanup Vida	do.	....	27-4-44	25-8-47	273	13	6,759	3.18	215.42	Burkitt & Brown	Parkview Commodore (306)
Radford Park Rose	Jersey	....	17-5-44	7-10-47	180	4	3,630	5.86	212.85	Radford Park Co.	Grassvale Golden Lad (19599)
Denmark Golden Acette ..	Guernsey	12681	28-6-44	19-12-47	120	18	3,060	6.82	208.79	Denmark Research Station	Denmark Ace (5738)
Lenmoor's Queen 5th	A.I.S.	....	20-6-44	15-8-47	240	4	6,045	3.44	208.26	G. W. Marston	Wooroloo Union Jack (7662)
Wooroloo Delys	do.	....	1-4-44	27-5-47	150	15	4,530	4.51	204.69	Wooroloo Sanatorium Farm	Wooroloo Top Gallant (7661)
Colliedale Biddy	Jersey	....	20-6-44	4-11-47	180	16.5	3,360	5.95	200.22	C. E. Kruger....	Belgonia Peggy 6th's Aim (17263)
Mereworth Dreaming Silvermine	do.	..	31-5-44	27-9-47	273	8.5	4,240	4.55	193.25	B. Langridge	Navua Coronation Star (14929)
Plenarbor Daffodil	A.I.S.	....	22-4-44	23-10-47	240	8	4,260	4.31	183.99	Mrs. V. Alexander ...	Glanavon Genius (3957)
Mokine Empire's Lily 42nd	Jersey	....	2-8-44	1-9-47	210	7.5	3,570	5.11	182.66	Davies & Sons	Mokine Triumph (21019)
Carbanup Gold	A.I.S.	..	1-3-44	2-7-47	150	34	5,385	3.38	182.49	D. H. Bell	Newstead Royal Sun (7252)
Plenarbor Toddles	do.	..	26-5-44	24-7-47	240	6.5	4,575	3.59	164.67	Mrs. V. Alexander	Glanavon Genius (3957)
Carbanup Gem . .	do.	..	19-6-44	29-7-47	120	36	4,620	3.49	161.67	D. H. Bell	Newstead Royal Sun (7252)
Lenmoor's Jean 2nd ...	do.	..	4-4-44	5-8-47	210	9	4,110	3.92	161.31	G. W. Marston	Ferndale Radiant (5729)
Wondella Butterfly 4th	Jersey	.	19-8-44	3-12-47	180	14	2,880	5.45	156.99	B. C. H. Hack	Radyr Park June Lad (20037)
Koojan Ace's Star	Guernsey	13508	11-6-44	11-8-47	120	23	2,970	5.02	149.31	R. J. Giles	Homstead Ace (Imp.) (1631)
Emerald Vale Handsome	A.I.S.	....	11 11-43	11-3-47	210	6	3,600	4.11	148.05	St. Joseph's Farm School	Scotch College Sir Nigel (8657)
Wooroloo Red Gum 2nd .	do.	.	5-5-44	25-7-47	90	34	3,330	4.42	147.39	Wooroloo Sanatorium Farm	Wooroloo Red Baron (6412)
Mayvale Discoverer's Bluebell 3rd	Guernsey	13659	28-7-44	1-10-47	180	6.5	3,600	3.99	143.64	R. J. Giles	Koojan Ideal's Discoverer (4968)
Denmark Daffodil . ..	do.	12678	21-4-44	16-7-47	60	35	2,175	4.88	106.20	Denmark Research Station	Koojan Ideal's Reflection (4974)
Valliere Mimosa 2nd	A.I.S.	....	12-7-44	17-8-47	60	31	1,980	4.65	92.10	J. H. Bensted & Co.	Valliere Warrior (8816)
Muresk Rona...	Guernsey	13946	9-6-44	7-12-47	30	29	870	4.66	40.56	Muresk Agricultural College	Koojan Ideal's Dictator (4167)

COWS 3½ YEARS AND UNDER 4 YEARS—STANDARD 290 LBS. BUTTER-FAT.

Grassvale Eve	Jersey	....	19-9-43	27-8-47	273	22.5	9,217	5.79	533.95	R. H. Rose & Son	Mornmoot Northwood Beau (1779)
Carydale Precious . .	do.	....	6-5-43	13-4-47	273	19	9,492	5.51	523.37	G. Layman	Hopelands Pattern (18624)
Capel Gibson Girl 2nd ..	A.I.S.	....	6-5-43	24-4-47	273	32	12,396	4.01	498.23	B. W. Prowse ..	Capel Star King (4672)
Koojan Ace's Diplomat	Guernsey	13489	28-8-43	31-8-47	273	18	8,064	5.97	481.56	A. W. Padbury ..	Homestead Ace (Imp.) (1631)
Travalgan Starbright 20th....	Jersey	....	15-4-43	12-3-47	273	23	7,869	6.00	472.32	J. C. Bushell	Orphanage Cuba (17913)
Grassvale Design's Noella	do.	....	20-10-43	2-9-47	273	15	9,225	5.09	470.42	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Valliere Memory	A.I.S.	..	18-6-43	5-6-47	273	10	11,295	4.03	455.74	M. L. House	Wooroloo Noble 4th (6411)
Carydale Pretty Janis ...	Jersey	97783	20-4-43	3-4-47	273	11.5	8,434	5.36	452.38	G. Layman	Hopelands Pattern (18624)
Capel Pretty Vision	A.I.S.	42457	15-5-43	19-5-47	273	21.5	10,924	3.84	420.24	B. W. Prowse	Capel Dove King (5579)
Valliere Honey	do.	....	7-7-43	30-5-47	240	15	9,255	4.23	392.10	M. L. House	Alpha Vale Reward (4518)
Trelawney A.B.	Jersey	..	27-4-43	4-4-47	273	22	7,791	5.03	392.03	J. C. Bushell	Greenmount Golden Patch (19603)
Denmark Dawn's Reflectionette	Guernsey	12679	7-9-43	17-5-47	273	15.5	6,391	5.99	383.09	Denmark Research Station	Koojan Ideal's Reflection (4974)
Muresk Dinah	do.	13926	28-11-43	4-10-47	273	25	8,365	4.52	378.60	Muresk Agricultural College	Koojan Ideal's Dictator (4167)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 3½ YEARS AND UNDER 4 YEARS.—STANDARD 290 LBS. BUTTER FAT.											
Muresk Susanna	Guernsey	13948	29-11-43	1-7-47	273	19	7,767	4.82	374.83	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Camden Celeste	Jersey	97747	10-9-43	5-5-47	273	14	5,787	6.40	370.41	D. G. Spark	Greenmount Golden Bobbie (18578)
Juadine Queen 2nd	do.		2-1-44	30-7-47	273	6.5	6,139	5.94	364.81	K. V. Gray	Juadine Northwood Beau (19670)
Carbanup Flirt	A.I.S.		23-6-43	10-2-47	273	38.5	8,230	4.28	353.81	D. H. Bell	Newstead Royal Sun (7252)
Eungella Telopia	Jersey	98286	20-5-43	9-5-47	273	10.5	5,926	5.93	351.89	D. G. Spark	Travalgan Starbright King (18129)
Korijekup Nadine	do.		23-11-43	18-6-47	273	12	5,916	5.89	348.93	Mrs. A. G. Eckersley	Juadine Captain (20840)
Glanavon Fairy 8th	A.I.S.		24-3-43	26-10-47	273	19	7,977	4.32	345.32	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Clovelly Hazel	Guernsey	12608	14-8-43	2-7-47	273	11	6,933	4.89	339.31	J. Cabassi	Lansdown Polydymite (4995)
Grantville Blossom 5th	A.I.S.		26-10-43	27-7-47	273	16	8,388	3.95	332.12	W. G. Burges	Swanlea Monarch 2nd (7514)
Carbanup Florrie	do.		25-6-43	1-2-47	273	29.5	9,313	3.56	331.85	D. H. Bell	Glanavon Maestro (4833)
Grassvale Magnolia 5th	Jersey	98526	16-10-43	13-8-47	240	5	6,525	5.04	329.01	R. H. Rose & Sons	Grassvale Gold Cup (20745)
Glanavon Pink Pearl 7th	A.I.S.		4-12-43	12-7-47	273	20	7,160	4.57	327.24	D. Bevan & Sons	Glanavon Limerick (6873)
Glanavon Maggie 3rd	do.		22-7-43	24-5-47	273	17	8,811	3.66	322.89	Burkett & Brown	Blacklands Jean's Supreme (1871)
Tipperary Beauty 19th	do.	47486	4-11-43	28-5-47	273	24	8,502	3.74	318.72	W. G. Burges	Tipperary Ace (6336)
Tirano Madame	do.		22-5-43	2-3-47	273	24.5	8,053	3.93	316.81	J. H. Bensted & Co.	Chittering Prince (3800)
Grayleigh Precious Gem	do.		2-9-43	29-6-47	273	15	7,995	3.95	316.18	W. G. Burgess	Swanlea Bertie (5290)
Carbanup Florrie	do.		13-2-43	19-1-47	273	7.5	7,882	3.98	314.00	D. H. Bell	Glanavon Maestro (4833)
Camden Selena	Jersey	97749	28-9-43	28-4-47	273	13	5,604	5.51	309.19	D. G. Spark	Greenmount Golden Bobbie (18578)
Walgett Ranunculas	do.		26-5-43	2-4-47	273	18	6,339	4.85	307.52	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Glanavon Rebecca	A.I.S.		25-9-43	17-7-47	273	14	7,572	4.01	303.72	D. Bevan & Sons	Newstead Triumph (3420)
Clovelly Lola	Guernsey	12612	7-9-43	28-5-47	273	15	6,435	4.62	297.38	J. Cabassi	Lansdowne Polydymite (4995)
Walgett Handsome Girl 32nd	Jersey		21-4-43	12-4-47	273	14	5,382	5.48	294.94	C. J. Cunningham	Selsey Wyandottes' Prince (18058)
Mokine Empire's Lily 41st	do.		10-10-43	23-4-47	273	6.5	5,389	5.45	294.01	Davies & Son	Mokine Royal Dick (21018)
Korijekup Royal Lady	do.		25-2-43	22-1-47	273	14	5,592	5·16	288.87	Mrs. A. G. Ekersley	Navan Royal Star (15869)
Mereworth Oxford Vanilla 3rd	do.	99301	30-4-43	21-4-47	273	14	5,322	5.42	288.80	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Glanavon Goldilocks 8th	A.I.S.		11-10-43	26-5-47	273	6	7,098	4.05	287.37	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Kapara Firefly	Jersey	98816	11-8-43	21-6-47	273	5	5,400	5·22	282·16	W. L. Bradford	Congelin Mandarin (14542)
Glanavon Lulu 4th	A.I.S.		4-9-43	23-8-47	273	15	6,195	4·40	272·58	D. Bevan & Sons	Newstead Triumph (3420)
Rutherwood Golden Butterfly	Guernsey	14487	22-1-44	31-8-47	273	10·5	4,876	5·52	269·56	Misses E. & I. Rutherford	Denmark Golden Rippler (5751)
Grantham Silvermine 4th	Jersey	98518	21-11-43	31-8-47	273	14·5	6,073	4·34	263·72	B. Langridge	Rosecliffe Marchalong (15094)
Rosella Pauline	Guernsey	14403	8-8-43	15-5-47	273	7	4,941	5·34	263·75	Darnell Brothers	Cranbourne Charlie (3993)
Camden Milkmaid	Jersey		9-12-43	25-6-47	273	12	4,986	5·12	255·60	C. E. Kruger	Greenmount Starbright (20748)
Glanavon Rosina 7th	A.I.S.		25-9-43	5-6-47	273	11	6,843	3·72	254·40	Burkitt & Brown	Glanavon Limerick (6873)
Rosella Bloom	Guernsey	14391	1-9-43	23-5-47	210	15	5,160	4·86	250·68	Darnell Brothers	Cranbourne Charlie (3993)
Mokine Empire Lily 40th	Jersey		27-9-43	23-6-47	273	8·5	5,470	4·54	249·70	Davies & Sons	Mokine Royal Dick (21018)
Carbanup Fay	A.I.S.		17-8-43	3-6-47	180	36·5	7,275	3·41	248·28	D. H. Bell	Newstead Royal Sun (7252)
Wooroloo Gladys 3rd	do.		10-2-43	19-12-46	273	11	5,373	4·53	243·86	Wooroloo Sanatorium Farm	Berry Rufus 2nd (6570)

Tipperary Lady May 6th	do.	....	8-5-43	17-3-47	240	5	6,060	4·00	242·55	W. G. Burgess	Tipperary Ace (6336)
Glanavon Dahlia 19th ...	do.	....	6-8-43	18-7-47	273	5	5,865	4·12	241·57	D. Bevan & Sons	Newstead Triumph (3420)
Tirano Shirley	do.	....	1-7-43	5-3-47	273	13	5,844	4·07	237·85	J. H. Bensted & Co.	Chittering Prince (3800)
Glanavon Thelma 6th ..	do.	....	15-10-43	16-9-47	273	14	6,162	3·85	237·28	D. Bevan & Sons	Glanavon Limerick (6873)
Grassvale Buttercup 14th ...	Jersey	98523	7-9-43	15-6-47	150	13	4,080	5·81	237·21	R. H. Rose & Son	Grassvale Gold Cup (20745)
Carbanup Fancy	A.I.S.	....	15-3-47	17-2-47	273	22·5	6,362	3·72	237·14	D. H. Bell	Newstead Royal Sun (7252)
Rosella Ladybird	Guernsey	14398	29-11-43	15-8-47	120	10·5	4,875	4·83	235·38	Darnell Brothers	Cranbourne Charlie (3993)
Lenmoor's Peggy 2nd ...	A.I.S.	....	15-1-44	26-7-47	273	3·5	5,190	4·44	230·57	G. W. Marston	Ferndale Radiant (5729)
Mereworth Oxford Makinora	Jersey	....	28-6-43	22-4-47	273	10	4,575	4·97	227·56	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Clovelly Diamond	Guernsey	12602	10-6-43	2-5-47	273	10	4,500	5·00	225·22	J. Cabassi	Lansdowne Polydymite (4995)
Wooroloo Vanity 2nd	A.I.S.	...	9-11-43	1-7-47	120	33	4,920	4·52	222·72	Wooroloo Sanatorium Farm	Berry Rufus 2nd (6570)
Glanavon Goldilocks 7th ...	do.	. .	17-9-43	4-9-47	210	16	5,580	3·91	218·40	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Walgett Proud Wyandotte....	Jersey	....	1-5-43	12-4-47	273	11	4,638	4·68	217·41	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Wokanup Daphne 2nd ...	A.I.S.	....	10-10-43	2-8-47	210	10	6,390	3·31	211·59	Burkitt & Brown	Parkview Commodore (306)
Narrogin Flo	do.	....	6-4-43	11-3-47	210	14	5,805	3·37	195·84	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Radford Park Pansy	Jersey	....	22-5-44	13-8-47	240	3	4,125	4·73	195·15	Radford Park Co.	Grassvale Golden Lad (19599)
Valliere Dove 2nd	A.I.S.	....	20-1-44	20-8-47	150	25	5,595	3·47	194·34	J. H. Bensted & Co.	Wooroloo Noble 4th (6411)
Muresk Gwenda	Guernsey	13932	3-5-43	11-1-47	180	16	4,275	4·54	194·13	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Mokine Twylish Lass 10th	Jersey	....	1-3-44	4-12-47	120	28·5	3,675	4·80	176·67	T. H. Wilding	Mokine Royal Dick (21018)
Glanavon Pink Pearl 6th	A.I.S.	....	2-10-43	7-9-47	210	7·5	4,995	3·37	168·60	Burkitt & Brown	Blacklands Jean's Supreme (1871)
Tipperary Dove 2nd ..	do.	....	29-3-43	8-2-47	180	5	3,900	4·03	157·53	W. G. Burges	Tipperary Ace (6336)
Plenarbor Tottie .. .	do.	. .	26-5-44	11-2-48	150	24	3,570	3·72	132·84	Mrs. V. Alexander	Glanavon Genius (3957)
Tipperary Dove 23rd ..	do.	....	7 4-43	1-1-47	90	30	3,120	4·00	124·86	W. G. Burges	Tipperary Ace (6366)
Plenarbor Hettie	do.	...	6-1-43	7-11-46	210	5	2,730	3·53	96·60	Mrs. V. Alexander	Glanavon Genius (3957)
Glanavon Red Wing ..	do.	...	1-4-44	21-2-48	90	18	2,250	3·70	83·43	D. Bevan & Sons	Newstead Triumph (3420)
Plenarbor Daisy 2nd ...	do.	....	5-3-44	26-11-47	90	15·5	2,025	4·03	81·63	Mrs. V. Alexander	Glanavon Genius (3957)
Koojan Ace's Juliette ..	Guernsey	13501	29-5-44	15-12-47	60	20	1,485	5·06	75·18	R. J. Giles	Homestead Ace (1631) (Imp.)
Plenarbor Pearl	A.I.S.	....	6-5-44	8-1-48	90	18·5	2,025	2·24	65·79	Mrs. V. Alexander	Glanavon Chief (6864)
Denmark Ace's Briarette	Guernsey	12670	9-8-43	23-5-47	60	13·5	1,125	5·48	61·74	Denmark Research Station	Denmark Ace (5738)

COWS 4 YEARS AND UNDER 4½ YEARS—STANDARD 310 LB. BUTTERFAT.

Grassvale Golden Cream 26th	Jersey	98525	3-8-43	3-9-47	273	17·5	8,677	6·18	536·92	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Travalgan Starbright 23rd	do.	100462	27-6-43	2-7-47	273	20	8,310	6·21	515·76	J. C. Bushell	Orphanage Douglas (18919)
Muresk Anna	Guernsey	11058	28-9-42	13-3-47	273	29·5	10,663	4·60	491·12	Muresk Agricultural College	Koojan Ideal's Dictator (4167)
Eungella Faline	Jersey	98285	4-5-43	24-5-47	273	15	8,475	5·54	470·02	D. G. Spark	Travalgan Starbright King (18129)
Capel Dove 2nd	A.I.S.	....	18-5-43	10-7-47	273	7·5	10,717	4·27	458·47	B. W. Prowse	Capel Lottie's Reward (3782)
Muresk Delicia's Pride	Guernsey	13923	11-6-43	15-8-47	273	18	9,474	4·81	455·73	Muresk Agricultural College	Koojan Ace's Warspite (5943)
Mokine Twylish Lass 9th	Jersey	. .	31-3-43	12-9-47	273	9	7,842	5·53	434·13	Davies & Sons	Mokine Brigadier (18799)
Tipperary Dove 25th	A.I.S.	40635	6-5-43	7-8-47	273	21	11,553	3·71	429·74	W. G. Burges	Tipperary Ace (6336)
Glanavon Doris 14th	do.	...	21-5-42	20-10-46	273	19	9,942	4·29	427·24	D. Bevan & Sons	Newstead Triumph (3420)
Radyr Park Dorothy 22nd	Jersey	....	7-6-43	27-7-47	240	10	6,720	6·27	421·35	F. Campbell	Navua September Lad (14023)
Juadine Fairy	do.	93213	12-6-43	23-6 47	240	14	6,360	6·50	413·91	K. V. Gray	Juadine Northwood Beau (19670)
Denmark Reflection's Dame	Guernsey	12693	15-2-43	4-7-47	273	14·5	8,383	4·81	403·81	Denmark Research Station	Koojan Ideal's Reflection (4974)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 4 YEARS AND UNDER 4½ YEARS—STANDARD 310 LB. BUTTERFAT—*continued.*											
Walgett Royal Joy	Jersey	....	2-5-43	29-6-47	273	11	6,873	5·57	383·19	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Mayvale Golden Diana	Guernsey	13663	6-5-42	28-10-46	273	16	6,738	5·30	357·72	R. J. Giles	Koojan Ideal's Discoverer (4968)
Trelawney Belle	Jersey	....	12-5-43	25-5-47	273	16	5,508	6·40	352·64	F. Campbell	Greenmount Golden Patch (19603)
Mokine Empire's Twylish 15th	do.	99412	1-4-43	2-7-47	273	13	5,964	5·78	345·05	Davies & Sons	Mokine Brigadier (18799)
Radyr Park September's Estrellita	do.	....	22-6-43	1-7-47	273	11	5,610	6·09	341·84	L. M. Temple	Navua September Lad (14023)
Walgett Delightful	do.	....	21-4-43	25-6-47	273	12	6,591	4·93	325·55	C. J. Cunningham	Selsey Wynadotte's Prince (18058)
Lansdowne Ideal's Pride	Guernsey	13533	9-1-43	6-2-47	273	24	5,952	5·43	323·47	J. R. Giles	Koojan Beau Ideal (4965)
					365	15	7,680	5·44	418·21		
Glanavon Doris 17th	A.I.S.	....	21-7-43	31-8-47	273	18	7,824	4·00	313·03	D. Bevan & Sons	Blackland's Jean's Supreme (1871)
Mokine Empire Lily 35th	Jersey	....	29-6-42	28-10-46	273	14	5,592	5·42	303·19	K. V. Gray	Selsey Hall Boy (15136)
Wooroloo Gail	A.I.S.	....	28-2-43	19-4-47	180	30	6,510	4·64	302·16	Wooroloo Sanatorium Farm	Wooroloo Red Baron (6412)
Clovelly Melba	Guernsey	12613	21-6-43	10-7-47	273	8·5	6,190	4·69	290·80	J. Cabassi	Lansdowne Polydymite (4995)
Carbanup Fragrance	A.I.S.	....	10-2-43	25-3-47	273	15	7,590	3·76	285·55	D. H. Bell	Newstead Royal Sun (7252)
Claremont Biddy 71st	do.	....	18-11-42	12-2-47	273	26	7,473	3·81	285·43	W. K. Barnes	Westby Monarch (5404)
Mereworth Oxford Gay	Jersey	....	12-5-43	31-8-47	273	5	5,550	5·06	281·18	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Walgett Handsome Girl 31st	do.	....	20-4-43	10-5-47	273	8	6,114	4·59	281·07	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Mereworth Oxford Montrose	do.	....	4-5-43	17-7-47	273	4	5,952	4·54	270·72	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Travalgan Lady Eion 17th	do.	110454	29-5-43	20-8-47	210	8·5	4,455	6·05	269·76	Davies & Sons	Orphanage Douglas (18919)
Carbanup Floss	A.I.S.	....	23-4-43	16-5-47	180	40	7,770	3·34	260·19	D. H. Bell	Newstead Royal Sun (7252)
Juadine Jewel 4th	Jersey	....	4-10-43	1-11-47	150	12	4,170	6·22	259·47	F. Campbell	Juadine Northwood Beau (19670)
Rutherwood Daffodil	Guernsey	14484	18-5-43	28-8-47	273	13	4,719	5·40	255·20	Misses E. & I. Rutherford	Rutherwood Robin Adair (5238)
Melbury Chance	A.I.S.	....	27-4-42	23-10-46	273	10	6,435	3·93	253·07	G. W. Marston	Claremont Mount Rufus (3803)
Mereworth Starbright's Audrey 6th	Jersey	....	7-4-43	15-8-47	273	5	5,355	4·64	248·57	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Carbanup Floxy	A.I.S.	....	19-2-43	10-4-47	240	18	7,110	3·38	240·99	D. H. Bell	Newstead Royal Sun (7252)
Carbanup Fuchsia	do.	....	16-2-43	17-6-47	150	35	6,960	3·39	236·22	D. H. Bell	Newstead Royal Sun (7252)
Tirano Katoomba 2nd	do.	47508	12-2-43	26-7-47	180	24·5	6,045	3·84	231·93	J. Bensted & Co.	Chittering Prince (3800)
Lenmoor's Roma	A.I.S.	45031	16-8-43	11-10-47	240	4	5,430	4·08	222·06	W. K. Barnes	Ferndale Radiant (5729)
Mereworth Starbright's Queen 5th	Jersey	....	9-5-43	5-8-47	273	2	4,821	4·58	220·88	B. Langridge	Grantham Oxford Standard (18571)
Tirano Allison	A.I.S.	....	26-5-43	6-7-47	210	15·5	6,015	3·64	219·24	J. Bensted & Co.	Chittering Prince (3800)
Mereworth Oxford Buttercup 2nd	Jersey	....	9-5-43	7-10-47	240	8	4,935	4·43	218·61	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Rutherwood Anne	Guernsey	14480	7-5-43	30-7-47	273	8	4,359	4·68	204·03	Misses E. & I. Rutherford	Rutherwood Robin Adair (5238)
Mayvale Discoverer's Bluebell 2nd	do.	13658	24-9-43	29-9-47	150	12·5	3,840	5·06	194·69	R. J. Giles	Koojan Ideal's Discoverer (4968)

Yokanup Carnation 4th	A.I.S.	....	10-2 43	10-8-47	180	16	5,520	3·51	193·92	Burkitt & Brown	Parkview Commodore (306)
Carbanup Freda	do.	..	8-7-43	18-9-47	90	54	5,190	3·11	161·64	D. H. Bell	Newstead Royal Sun (7252)
Glanavon Gwen 3rd	do.	..	29-6-43	1-12 47	120	10	2,985	5·14	153·54	Burkitt & Brown	Blacklands Monarch's Commander (1877)
Carydale Roberta	do.	..	13-3-43	12-5-47	180	16	4,590	3·33	153·27	M. H. Montgomery	Summerlea Robin Hood (5261)
Plenarbor Daphne	do.	..	19 6 43	30-9-47	210	8·5	4,110	3·60	148·23	V. Alexander	Glanavon Genius (3957)
Emerald Vale Handsome ..	do.	.	11-11-43	26-4-48	90	22·5	2,025	3·90	79·11	St. Joseph's Farm School	Scotch College Sir Nigel (8657)
Emerald Vale Melba	do.	....	13-2-44	26-3-48	90	15·5	1,755	2·97	52·23	St. Joseph's Farm School	Scotch College Sir Nigel (8657)
Plenarbor Toddles	do.	....	26-5-44	6-6-48	30	29·5	885	4·28	37·74	Mrs. V. Alexander ..	Glanavon Genius (3957)

COWS 4½ YEARS AND UNDER 5 YEARS—STANDARD 330 LB. BUTTERFAT.

Grassvale Silvermine 2nd	Jersey	....	8-9-42	25-6 47	273	20	9,990	5·31	530·70	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Walgett Handsome Girl 29th	do.	....	24-6-42	22 4 47	273	21	7,263	6·91	502·05	C. J. Cunningham ...	Selsey Wyandotte's Prince (18058)
Travalgan Lady Eion 16th ...	do.	100454	3-9-42	3-7-47	273	20	8,280	5·74	475·53	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Denmark Bonnie Princess ...	Guernsey	12676	28-11-42	4 7-47	273	22	9,186	4·87	447·58	Denmark Research Station	Koojan Ideal's Reflection (4974)
Eungella Miss Muffet ...	Jersey	92031	5-5-42	5 5 47	273	18	7,644	5·50	420·80	D. G. Spark	Travalgan Star Bright King (18129)
Clovelly Lily	Guernsey	10244	25-8-42	18-7 47	273	13	7,479	5·50	411·57	J. Cabassi	Lansdowne Polydymite (4995)
Denmark Lady Diana 2nd....	do.	12687	29-10-42	22-9-47	273	13	6,399	6·38	408·87	Denmark Research Station	Denmark Dawn's Appollo (4785)
Clovelly Cherry	do.	10239	24-8-42	17-7-47	273	10	7,875	5·14	405·40	J. Cabassi	Koojan Monogram (4174)
Colmyn Empress	Jersey	97884	9-9 42	11-8-47	273	10·5	6,541	5·89	385·91	C. H. Ironmonger	Greenmount Cream Lad (18577)
Radyr Park Dorothy 20th	do.	99940	17-6-42	21 4-47	273	18	7,464	5·07	378·50	L. M. Temple	Navua September Lad (14023)
Warralyn Marie 10th	do.'	89542	4-6-42	29-5-47	273	17	6,501	5·70	371·14	M. B. Stott	Juadine Sparkle's Wonder (18659)
Glanavon Fussy 2nd .. .	A.I.S.	....	20-9-42	18-7-47	273	12	9,396	3·93	369·35	D. Bevan & Sons	Blacklands Monarch's Commander (1877)
Kapara Velveteen	Jersey	93311	23-5-42	16-5-47	273	8	8,074	4·51	364·78	D. Bradford	Congelin Mandarin (14542)
Greenmount Dewdrop 3rd	do.	....	11 8-42	23-2-47	273	20	5,670	6·37	361·26	K. V. Gray	Greenmount Silver Lord (17546)
Lansdowne Bonnie Elizabeth	Guernsey	10706	1 6 42	29 5-47	273	19	7,092	5·09	361·08	J. R. Giles	Koojan Beau Ideal (4965)
Kapara Sparkle's Lassie 2nd	Jersey	98818	14 10-42	2 5-47	273	25	7,860	4·41	346·75	W. L. Bradford	Congelin Jolly Eminent 3rd (18425)
Walgett Handsome Girl 30th	do.	....	9 7-42	16-4-47	273	17·5	6,337	5·45	345·62	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Kapara Duchess	do.	98815	14-9-42	9 5-47	273	7	5,991	5·50	329·78	D. Bradford	Congein Mandarin (14542)
Glanavon Goldilocks 5th	A.I.S.	....	10-10-42	5 6-47	273	5	7,605	4·14	315·26	D. Bevan & Sons	Glanavon Federal (6869)
Lenmoor's Queen 4th	do.	..	9-7-42	19 6-47	210	12	6,345	4·51	286·50	G. W. Marston	Ferndale Memento (3194)
Summerlea Swallow 18th	do.	....	31-7-42	19-7-47	240	13	6,435	4·38	281·14	M. H. Montgomery	Summerlea Tojo's Triumph (6243)
Narrogin Doreen	do.	....	13-8-42	20-3-47	273	17	8,601	3·24	278·94	Narrogin School of Agriculture	Tipperary Amy's Mascot (6338)
Walgett Handsome Girl 28th	Jersey	....	21-5-42	4-4-47	273	17	5,976	4·63	276·86	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Grassvale Lady Fowler 37th	do.	92720	21-8-42	29-4-47	180	26·5	5,580	4·81	268·56	R. G. Brazier	Mornmoot Northwood Beau (17798)
Campania Lulu	A.I.S.	....	1-5-42	12-4-47	273	6·5	6,544	3·67	240·39	K. Prowse	Longridge Triumph (5932)
Yokanup Ulery	do.	....	18 10-42	19-7-47	273	7	6,591	3·34	220·32	Burkitt & Brown	Parkview Commodore (306)
Grassvale Buttercup 11th	Jersey	92714	5-7-42	5 5-47	180	20	3,975	5·37	213·69	R. G. Brazier	Mornmoot Northwood Beau (17798)
Narrogin Flossette	A.I.S.	....	18-8-42	14-8-47	273	6·5	5,959	3·46	206·55	Christian Brothers' Farm School	Tipperary Amy's Mascot (6338)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 4½ YEARS AND UNDER 5 YEARS—STANDARD 330 LB. BUTTERFAT—*continued.*											
Burlington Beauty	Jersey	97716	25-10-42	3-8-47	210	6·5	3,645	4·52	164·97	B. C. H. Hack	Lawrenny Johnnie (16670)
Wondella Noble Lass	do.	....	26-12-42	6-12-47	180	12	2,880	5·10	147·15	B. C. H. Hack	Congelin Jolly Eminent 2nd (18424)
Tirano Sally	A.I.S.	....	18-10-42	19-5-47	120	21	3,135	3·69	115·80	J. H. Bensted & Co.	Chittering Prince (3880)
Glanavon Pansy 6th	do.	....	24-4-42	24-3-47	120	9	2,430	3·96	96·27	D. Bevan & Sons	Newstead Triumph (3420)
Grantham Silvermine 3rd	Jersey	....	9-8-42	28-6-47	30	27·5	825	3·60	29·73	B. Langridge	Rosecliffe Marchalong (15094)
COWS 5 YEARS OLD AND OVER—STANDARD 350 LB. BUTTERFAT.											
Camden Ariadne	Jersey	85538	10-8-40	31-5-47	273	38	10,869	6·94	754·37	C. E. Kruger	Greenmount Golden Sultan (14688)
					365	24	12,975	7·00	908·86		
Congelin Iolanthe 8th	do.	80828	22-4-40	20-5-47	273	35	13,215	5·57	737·19	D. Bradford	Rosecliffe Marchalong (15094)
Mokine Beauty	do.	94437	20-9-41	23-6-47	273	35	11,625	5·54	644·50	T. H. Wilding	Erlwin Royal Volunteer (16491)
Juadine Sally	do.	98755	5-10-41	26-5-47	273	24	10,842	5·84	633·22	M. B. Stott	Austral Park Wonderful Standard (12423)
Congelin Rosemarie 6th	do.	80830	14-4-40	17-4-47	273	28	9,954	6·34	631·96	D. Bradford	Rosecliffe Marchalong (15094)
Greenmount Golden Ray	do.	8663	16-6-41	11-2-47	273	30	9,660	6·51	629·69	J. C. Bushell	Belgonia Peggy 6th Aim (17263)
Koojan Golden Jewel	Guernsey	8805	12-3-40	25-12-46	273	24	10,182	5·65	575·59	A. W. Padbury	Koojan Beau Ideal (4965)
Valliere Kate	A.I.S.	40817	28-6-40	30-3-47	273	23	12,414	4·58	568·58	M. L. House	Alpha Vale Patrico (3649)
Mokine Daisy 2nd	Jersey	77788	4-5-38	12-9-37	273	20	10,200	5·48	558·96	T. H. Wilding	Selsey Hall Boy (15136)
Grassvale Lady Fowler 33rd	do.	92716	7-7-41	2-6-47	273	15	9,885	5·46	539·71	R. H. Rose	Monmoot Northwood Beau (17798)
Wooroloo Netta 2nd	A.I.S.	33996	6-10-39	29-1-47	273	29	12,147	4·38	532·60	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Muresk Daltana	Guernsey	11060	22-3-41	22-4-47	273	28	10,584	4·95	524·15	Muresk Agricultural College	Denmark Damon (2519)
Grassvale Magnolia 4th	Jersey	86645	23-11-41	2-7-47	273	12	9,741	5·20	507·05	R. H. Rose & Son Station	Monmoot Northwood Beau (17798)
Muresk Lady Boniface	Guernsey	11067	23-4-41	25-7-47	273	23	9429	5·35	505·13	Muresk Agricultural College	Denmark Damon (2519)
Denmark Golden Valencia 2nd	do.	8535	15-9-39	6-5-47	273	23	9079	5·53	502·71	Denmark Res. Stn.	Koojan Ace's Goldseeker (3431)
Valliere Star	A.I.S.	33720	28-3-39	8-3-47	273	18	11,289	4·42	499·10	C. P. House	Alpha Vale Patrico (3649)
Koojan Ideal's Jacqueline	Guernsey	10695	14-3-41	14-3-47	273	27	9,171	5·38	494·07	A. W. Padbury	Glenburnie Ideal (Imp.) (2548)
Lansdowne Jocelyn	do.	10720	15-7-40	30-11-46	273	27	9,651	5·06	489·25	A. W. Padbury	Koojan Beau Ideal (4965)
Denmark Ace's Rose	do.	10284	29-11-41	11-5-47	273	24	9,237	5·22	482·94	Denmark Res. Stn.	Homestead Ace (Imp.) (1631)
Walgett Handsome Girl 13th	Jersey	81634	17-8-40	23-8-47	273	22·5	9,532	4·85	462·85	R. H. Rose & Son	Grassvale Gold Boy (14684)
Glanavon Dahlia 7th	do.	79448	2-5-38	11-5-47	273	19	9,957	4·63	461·17	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Colmyn Golden Lustre	A.I.S.	30581	23-3-38	10-10-46	240	32	10,530	4·35	458·16	D. Bevan & Sons	Glanavon Neptune (3959)
	Jersey	80800	5-9-40	19-8-47	273	12	8,826	5·17	456·67	C. H. Ironmonger	Clarendon Eyre Golden Oxford (13606)
Greenmount Marion	do.	86666	7-5-41	16-3-47	273	29	9,402	4·76	448·05	K. V. Gray	Belgonia Peggy 6th's Aim (17263)
Grassvale Lady Fowler 21st	do.	66784	3-11-35	3-9-47	273	20	8,475	5·20	441·15	R. H. Rose & Son	Melrose Lost Key (7974)

Colmyn Golden Margot	Jersey	80801	29–7–40	23–3–47	273	29	8,557	5·05	432·24	C. H. Ironmonger	Clarendon Eyre Golden Oxford (13606)
Valliere Countess	A.I.S.	40798	5–7–41	7–4–47	273	12·5	10,957	3·94	432·07	M. L. House	Wooroloo Searchlight (6415)
Warralyn Marie 5th	Jersey	84475	14–8–39	6–5–47	273	22	7,491	5·73	429·60	M. B. Stott	Juadine Hall Boy (16615)
Denmark Velveteen	Guernsey	8541	24–7–39	28–10–46	273	14·5	7,798	5·50	429·60	Denmark Research Station	Koojan Ace's Goldseeker (3431)
Denmark Mary's Bonnie	do.	10295	22–7–41	24–2–47	273	24	7,572	5·60	424·06	Denmark Research Station	Denmark Lady's Goldseeker (4799)
Lenmoor's Queen 2nd	A.I.S.	37904	24–7–40	15–6–47	273	8	11,539	3·64	419·92	G. W. Marston	Lenmoor's Gem (4977)
Walgett Joy's Gift	Jersey	....	6–4–42	22–4–47	273	25	8,880	4·71	418·80	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Walgett Handsome Girl 20th	do.	84441	21–4–39	27–5–47	273	12	7,341	5·66	416·07	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Capel Fairy 3rd	A.I.S.	42453	30–4–42	3–6–47	273	16·5	10,924	3·79	414·18	K. Prowse	Capel Lottie's Reward (3782)
Grassvale Buttercup 7th	Jersey	81622	9–9–39	27–7–47	273	13·5	7,465	5·50	410·99	R. H. Rose & Son	Grassvale Gold Boy (14684)
Glanavon Pansy 5th	A.I.S.	36568	13–6–39	6–1–47	273	23	10,179	4·03	410·84	D. Bevan & Sons	Glanavon Franklyn (4829)
Radyr Park Dorothy 10th	Jersey	83556	4–7–39	6–9–47	273	18·5	9,130	4·49	410·00	L. M. Temple	Navua Coronation Star (14929)
Denmark Bonnie Mary	Guernsey	6958	30–9–37	4–7–47	273	18	7,974	5·11	407·98	Denmark Research Station	Denmark Illustrius (3320)
Tipperary Beauty 7th	A.I.S.	33565	29–7–39	2–6–47	273	24	10,062	4·03	406·30	W. G. Burges	Wooroloo Melba's Triumph (4491)
Radyr Park Dorothy 19th....	Jersey	95267	16–3–42	17–9–47	273	18	8,739	4·62	404·11	L. M. Temple	Navua Coronation Star (14929)
Grassvale Nora's Maid	do.	98527	9–9–41	11–8–47	273	15·5	8,656	4·61	399·62	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Denmark Diana	Guernsey	6963	28–6–36	1–1–47	273	23·5	7,360	5·42	399·53	Denmark Research Station	Denmark Damon (2519)
Juadine Peggy	Jersey	93219	16–9–41	17–12–47	273	25	7,395	5·34	395·00	J. C. Bushell	Austral Park Wonderful Standard (12423)
Tipparary Lady	A.I.S.	28225	28–7–37	9–5–47	273	17	10,761	3·65	393·52	K. Prowse	Newstead Royal Light (3416)
Walgett Melanie	Jersey	....	10–4–41	1–6–47	273	13	6,789	5·79	393·25	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Kapara Happy Days 2nd	do.	93309	3–12–41	18–4–47	273	17	7,011	5·59	392·41	D. Bradford	Grantham Easter Oxford (14677)
Walgett Lady Wynadotte	do.	....	29–4–42	14–6–47	273	16·5	8,044	4·81	386·99	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Walgett Handsome Girl 25th	do.	....	7–4–42	1–6–47	273	14·5	7,528	5·12	386·12	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Glanavon Golden Girl 4th	A.I.S.	36554	10–11–39	27–11–46	273	24	11,157	3·45	384·95	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Juadine Julienne	Jersey	87020	2–3–40	19–7–47	273	11·5	7,789	4·92	383·14	Mrs. M. A. Watson	Austral Park Wonderful Standard (12423)
Grassvale Lady Fowler 36th	do.	....	28–5–42	30–6–47	273	16	7,548	5·07	383·07	R. H. Rose & Son	Grassvale Gold Boy (14684)
Mokine Empire Lily 37th	do.	....	25–8–42	5–9–47	210	12·5	6,600	5·79	382·77	Davies & Sons	Mokine Brigadier (18799)
Walgett Handsome Girl 16th	do.	84439	29–3–39	5–6–47	273	16·5	7,339	5·20	381·75	C. J. Cunninham	Walgett Masterman (15271)
Clovelly Golden Pride	Guernsey	8501	26–10–38	5–6–47	273	13·5	7,900	4·82	380·93	J. Cabassi	Drakesbrook Golden Gift (2651)
Valencia Vale Chloe	Jersey	....	8–6–40	31–7–47	273	9·5	6,178	6·13	379·24	K. V. Gray	Grassvale Fowler's Twylish (12733)
Denmark Dame 2nd	Guernsey	10289	6–11–41	14–3–47	273	21	7,248	5·23	379·16	Denmark Research Station	Denmark Lady's Goldseeker (4799)
Colmyn Golden Carnation	Jersey	80795	30–7–40	4–8–47	273	12·5	7,012	5·34	374·45	C. H. Ironmonger	Clarendon Eyre Golden Oxford (13606)
Rutherwood Rosebud	Guernsey	7827	15–7–37	29–4–47	273	23	7,809	4·70	367·46	Misses E. & I. Rutherford	Demark Robin Hood (3322)
Lenmoor's Queen 3rd	A.I.S.	....	12–11–41	5–8–47	273	19	8,937	4·08	365·28	G. W. Marston	Ferndale Memento (3194)
Melbury's Spring	do.	....	18–7–39	9–5–47	273	23·5	9,805	3·70	362·89	K. Prowse	Claremont Mount Rufus (3803)
Walgett Joyful	Jersey	79450	29–8–38	2–4–47	273	23	6,684	5·41	362·26	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Grassvale Topsy	do.	86647	11–8–41	30–4–47	273	15·5	7,561	4·77	361·19	K. V. Gray	Mornmoot Northwood Beau (17798)
Tirano Alice	A.I.S.	22916	31–5–36	16–3–47	273	25·5	9,016	4·00	360·95	J. H. Bensted & Co.	Bryn Y Mor Charmer (266)
Lenmoor's Bluebell	do.	37898	12–4–42	10–9–47	240	5	8,925	4·03	359·67	G. W. Marston	Ferndale Memento (3194)
Grantham Easter Rye 5th	Jersey	66773	8–7–37	14–5–47	273	15	6,150	5·84	359·46	B. Langridge	Greenmount Black Prince (6511)
Mereworth Rye Buttercup	do.	67930	29–6–38	11–9–47	273	12	7,101	5·03	357·54	B. Langridge	Mereworth Rye Duke (13953)
Walgett Handsome Girl 19th	do.	84440	6–4–39	5–4–47	273	18	6,324	5·64	357·30	C. J. Cunningham	Sabina Vale Betty's Beau (10018)

TABLE 9—HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 5 YEARS OLD AND OVER—STANDARD 350 LB. BUTTERFAT—*continued.*											
Clovelly Golden Flirt	Guernsey	8500	1 6 39	27-6 47	240	11	7,050	5·06	356·61	J. Cabassi	Koojan Monogram (4174)
Colmyn Golden Patsy	Jersey	80804	27-5 39	6-6 47	210	23	7,275	4·85	353·19	G. Layman	Clarendon Eyre Golden Oxford (13606)
Denmark Golden Maria	Guernsey	8529	27 6-40	22 6-47	273	10	6,510	5·40	351·84	Denmark Research Station	Denmark Damauric (400)
Claremont Cherry 9th	A.I.S.	15955	25 11-34	25 4 47	273	24	7,282	4·77	347·90	Narrogin School of Agriculture	Tipperary Virginia Re-echo (970)
Tipperary Peggy 2nd	do.	40650	10 7 41	18 2 47	273	21	9,393	3·68	346·24	W. G. Burges	Tipperary Ace (6336)
Walgett Jocelyn	Jersey	89500	13 8 40	16 4 47	273	15	6,465	5·33	344·62	C. J. Cunningham	Selsey Wyandotte's Prince (18058)
Clovelly Crystal	Guernsey	10240	31 8-41	13 6-47	240	16·5	7,590	4·52	343·20	J. Cabassi	Koojan Monogram (4174)
Radyr Park Dorothy 4th	Jersey	63850	5 10-35	6 8-47	273	17	6,591	5·20	342·95	L. M. Temple	Greenmount Graceful Lad (7292)
Radyr Park Coronation Belle	do.	73600	5-7-47	5 6-47	273	10	6,780	5·03	341·32	L. M. Temple	Navua Coronation Star (14929)
Glanavon Doris 13th	A.I.S.	35541	25-2 41	10 4 47	273	16	8,028	4·17	334·81	D. Bevan & Sons	Blacklands Monarch's Commander (1877)
Rutherwood Robin's Daisy	Guernsey	9329	11-9 38	2-4-47	273	22	6,381	5·20	331·94	Misses E. & I. Rutherford	Denmark Robin Hood (3322)
Coogely Johnquil	do.	6945	1 11 37	23-12 46	273	19	5,802	5·65	327·94	Denmark Research Station	Coogely Judy's Goldmine (2621)
Denmark Angeline	do.	6956	4 7-37	3 1 47	273	12	5,991	5·46	327·59	Denmark Research Station	Koojan Golden Prosper (2283)
Mereworth Starbright's Vanilla 4th	Jersey	94249	7-5-41	15 5-47	273	19	6,582	4·93	324·50	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Wooroloo Wendy 3rd	A.I.S.	28662	27 9 38	4-1 47	273	9	7,587	4·25	323·10	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Carbanup Baroness	do.	29616	15-4-39	12 6 47	180	42	9,390	3·41	320·67	D. H. Bell	Glanavon Maestro (4833)
Walgett Heirloom	Jersey	89499	20-4 40	4 3-47	273	23	6,129	5·20	319·23	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Rosella Zinnia	Guernsey	11430	11 8-40	31-3-47	273	11	6,648	4·76	316·96	Darnell Brothers	Muresk Paul (4356)
Denmark Golden Dawn	do.	4118	9 1-33	14 1 47	273	26	5,853	5·40	316·60	Denmark Research Station	Koojan Golden Prosper (2283)
Clovelly Primrose	do.	10245	30 6 42	23-8-47	240	13	6,750	4·62	312·03	J. Cabassi	Koojan Monogram (4174)
Eungella Coquette	Jersey	81271	24 5-40	11 5 47	273	13	6,234	4·93	307·77	D. G. Spark	Greenmount Golden Sovereign (14687)
Narrogin Donna	A.I.S.	32144	27 10 39	10-7-47	240	14	7,890	3·54	306·42	Narrogin School of Agriculture	Wooroloo Sterling 3rd (3626)
Radyr Park Coronation's Estrellita	Jersey	83555	27 7 39	8-6-47	273	11	5,688	5·31	302·30	L. M. Temple	Navua Coronation Star (14929)
Plenarbor Flora	A.I.S.	27198	19-7 38	25 4 47	240	14	9,270	3·25	302·10	K. Prowse	Tipperary Empress' Monarch (4436)
Eungella Bonetta	Jersey	92029	17 5 41	18 6-47	240	7	6,180	4·82	297·78	D. G. Spark	Travalgan Starbright King (18129)
Woodendale Ragtime's Violet	do.	69775	14-6 36	27-6-47	273	5	5,550	5·34	296·65	Radford Park Co. ..	Spring Park Prince Ragtime (5942)
Koojan Golden Ripple	Guernsey	7248	26 3 38	7-8-47	273	15	5,835	5·05	295·03	Denmark Research Station	Homestead Ace (Imp.) (1631)

Mereworth Starbright's Belvedere 6th	Jersey	87805	19-4-39	14 9-47	273	10	6,240	4·70	293·31	B. Langridge	Walgett Campanile's Chief (16167)
Carbanup Beatrice .	A.I.S.	29617	13-3-39	22 6-47	150	44	8,205	3·53	290·10	D. H. Bell	Glanavon Maestro (4833)
Radyr Park Dorothy 5th	Jersey	68752	18 7-36	21-8-47	240	11	5,130	5·56	285·66	L. M. Temple	Greenmount Graceful Lad (7292)
Walgett Easter Lily	do.	69572	20-4-37	31-3-47	273	20·5	6,221	4·58	285·22	C. J. Cunningham	Walgett Beau's Masterpiece (13349)
Narrogin Alice	A.I.S.	. .	14-4 42	15 8 47	273	15·5	7,566	3·76	284·54	Christian Bros. Farm School	Westby Masterpiece (5403)
Clovelly Margaret	Guernsey	6929	20 11 37	12-6-47	240	11	5,915	4·87	284·34	J. Cabassi	Nornabank Brian (3640)
Radyr Park June 2nd .	Jersey	88645	16-5-41	23 6-47	273	9	5,712	4·95	282·97	L. M. Temple	Navua Coronation Star (14929)
Walgett Golden Duchess	do.	79446	21-5-38	12-4-47	273	13·5	5,980	4·72	282·68	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Rutherwood Dinah	Guernsey	9324	3-11-39	15 3-47	273	20	6,150	4·59	282·40	Misses E. & I. Rutherford	Denmark Robin Hood (3322)
Yokanup Pansy	A.I.S.	. .	16-1-42	15-6 47	273	11	7,333	3·81	279·39	Burkitt & Brown	Parkview Commodore (306)
Mereworth Oxford Princess 2nd	Jersey	94245	24 2-41	11-9-47	273	9·5	5,938	4·70	279·27	B. Langridge	Clarendon Eyre Oxford Pioneer (11484)
Walgett Handsome Girl 12th	do.	79447	24 4-38	22 4-47	273	14·5	6,658	4·17	277·77	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Wooroloo Gladys 2nd ...	A.I.S.	...	3-2-42	11-2 47	240	11	6,270	4·40	276·18	Wooroloo Sanatorium Farm	Wooroloo Red Baron (6412)
Wooroloo Wynette	do.	41212	2-4-42	5 6-47	150	33	6,540	4·17	273·06	Wooroloo Sanatorium Farm	Wooroloo Red Baron (6412)
Glanavon Aster	do.	30575	18-1 38	25-3 47	273	16	6,843	3·95	270·44	D. H. Bell	Glanavon Nimrod (437)
Noorong Belladonna	Jersey	....	1-3-40	7-11 46	273	13·5	4,750	5·67	269·89	K. V. Gray	Clarendon Eyre Eminent Geisha
Radyr Park Dorothy 14th	do.	95266	22-4-41	26-1-47	273	11	5,778	4·64	268·30	L. M. Temple	Navua September Lad (14023)
Narrogin Colleen	A.I.S.	38665	22-8-41	11-3 47	273	19·5	7,198	3·72	267·79	Narrogin School of Agriculture	Westby Masterpiece (5403)
Carydale Golden Gem ...	Jersey	91110	15-6 41	22-8-47	150	25	5,265	5·08	267·45	G. Layman	Clarendon Eyre Golden Oxford (13606)
Radford Park Poppy Queen...	do.	95268	9-9-40	7-4-47	273	9	5,322	5·01	267·12	Radford Park Co.	Mokine Dunce (11896)
Norinya Nannette	do.	. .	9 6-39	28-3 47	273	21·5	5,359	4·97	266·55	Mrs. A. G. Eckersley	Austral Park Wonderful Standard (12423)
Eungella Bo-Peep	do.	71246	27 12-37	25-4-47	273	11	6,103	4·36	266·24	D. G. Spark	Greenmount Golden Sovereign (14687)
Clovelly Dainty	Guernsey	10241	5-8-41	11-9 47	240	5·5	5,730	4·62	264·81	J. Cabassi	Koojan Monogram (4174)
Lenmoor's Biddy . .	A.I.S.	. .	22-3-42	15-6 47	210	11	6,795	3·89	264·54	G. W. Marston	Ferndale Radiant (5729)
Valliere Milkmaid	do.	40824	15-4 40	6-4 47	273	13	6,909	3·81	263·62	W. K. Barnes	Alpha Vale Patrico (3649)
Glanavon Echo 2nd.. .	do.	36545	17-10 40	29 6 47	210	18	6,380	4·09	261·45	D. Bevan & Sons	Glanavon Gold's Final (5742)
Rosella Jeanette .. .	Guernsey	14397	2-4-42	6 6 47	240	6	4,395	5·94	261·27	Darnell Brothers	Muresk Commander (9599)
Hades Topsy Turvy .	A.I.S.	..	23 9 41	2 6 47	210	12	6,660	3·91	260·79	W. G. Burges	Hades Monarch (5800)
Camden Pit-a-Pat 2nd ..	Jersey	91042	13 1-42	28 9-47	240	10	5,265	4·94	260·43	B. Langridge	Greenmount Golden Sultan (14688)
Lenmoor's Joan 3rd	A.I.S.	37900	20-7-42	26 7-47	273	5·5	6,271	4·12	258·79	G. W. Marston	Ferndale Memento (3194)
Tipperary Dove 18th	do.	40638	8-8-41	3 2 47	210	19	6,570	3·92	258·69	W. G. Burges	Tipperary Ace (6336)
Camden Patsy . .	Jersey	85543	27-6-39	21 12-46	273	14·5	4,708	5·45	256·89	C. E. Kruger....	Greenmount Golden Sultan (14688)
Noorong Dahlia . .	do.	. .	26 12-39	2 8-47	240	8	5,370	4·77	256·23	K. V. Gray	Clarendon Eyre Eminent's Geisha 4th (13597)
Radford Park Marigold .	do.	95259	10 8 41	25-4 47	273	7·5	4,552	5·58	254·12	Radford Park Co.	Mokine Dunce (11896)
Capel Gibson Girl	A.I.S.	. . .	5 3-42	4-7-47	240	8·5	6,330	4·01	253·89	K. Prowse	Valliere Commodore (6360)
Radyr Park Dorothy 16th. .	Jersey	88643	4 6 41	6-3-47	273	3·5	4,735	5·29	250·88	L. M. Temple	Navua Coronation Star (14929)
Plenarbor Valli .. .	A.I.S.	....	15-2-42	3-5 47	240	4	7,410	3·38	250·83	Mrs. V. Alexander	Glanavon Genius (3957)
Narrogin Daisybell	do.	38668	10-10-40	11-3-47	273	10·5	6,571	3·81	250·79	Narrogin School of Agriculture	Westby Masterpiece (5403)
Rutherwood Jonquil . .	Guernsey	6263	18-5 36	17 6-47	273	11·5	4,714	5·26	247·97	Misses E. & I. Rutherford	Koojan Forty Winks (2738)

TABLE 9—HERDTESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test. lb.	Weight of Milk for Period. lb.	Average Test. %	Weight of Butter Fat for Period. lb.	Owner.	Sire.
COWS 5 YEARS OLD AND OVER—STANDARD 350 LB. BUTTERFAT.											
Carbanup Constance	A.I.S.	35384	25-2 40	25-3-47	273	11·5	7,264	3·40	247·09	D. H. Bell	Glanavon Maestro (4833)
Plenarbor Millie	do.	27200	5-8-38	8-5-47	180	25·5	7,665	3·20	245·52	K. Prowse	Tipperary Empress' Monarch (4436)
Carbanup Dahlia	do.	35386	22-3-41	16-2-47	273	6·5	5,743	4·13	237·38	D. H. Bell	Glanavon Maestro (4833)
Yanget Graceful 4th	do.	....	9-10-39	5-6-47	273	10	6,360	3·73	237·37	Mrs. V. Alexander	Leylands Defiance (2380)
Narrogin Mae	do.	45652	13-7-42	24-8-47	273	9	5,937	3·98	236·62	Christian Bros. Farm School	Tipperary Amy's Mascot (6338)
Carbanup Crocus	do.	35385	25-2-40	25-3-47	273	13	7,224	3·25	235·33	D. H. Bell	Glanavon Maestro (4833)
Glanavon Doris 12th	do.	36540	17-2-41	27-12-46	210	10	5,610	4·11	230·73	D. Bevan & Sons	Tipperary President (5335)
Wallatin Eighty Five	do.	40881	29-4-40	19-3-47	210	11	5,340	4·22	225·66	M. H. Montgomery	Summerlea Pioneer (6240)
Noorong Grace	Jersey	78124	3-10-33	19-12-47	180	23·5	4,740	4·74	225·09	C. E. Kruger	Grassvale Butter King (8209)
Plenarbor Curly	A.I.S.	46144	26-6 42	10-9-47	240	5·5	6,375	3·48	221·85	Mrs. V. Alexander	Glanavon Genius (3957)
Lenmoor's Gentle	do.	....	22-5-42	23-8-47	240	3	5,700	3·80	217·02	G. W. Marston	Wooroloo Union Jack (7662)
Travalgan Lady Eion 6th	Jersey	79293	19-8 39	17-6-47	120	31·5	4,065	5·31	216·09	R. G. Brazier	Glen Iris Golden Oxford (12694)
Yanget Baron's Grace	A.I.S.	41223	3 9-41	17-4-47	273	2·5	6,592	3·25	214·30	Mrs. V. Alexander	Yanget Baron (6416)
Rosella Sweetheart	Guernsey	11429	30-7-40	23-8-47	180	7	4,440	4·78	212·49	Darnell Brothers	Muresk Paul (4356)
Tirano Fancy	A.I.S.	..	17-4-41	19-9-47	180	14	5,400	3·84	207·81	M. H. Montgomery	Chittering Prince (3800)
Wongella Lady Lorraine	Jersey	....	31-3 41	24-12-47	180	17	3,795	5·40	205·20	B. C. H. Hack	Congelin Jolly Eminent 2nd (18424)
Narrogin Dolly	A.I.S.	38669	20-8-41	5-2-47	150	17	4,680	4·38	205·02	Narrogin School of Agriculture	Westby Masterpiece (5403)
Travalgan Lady Eion 8th	Jersey	84258	19-9-40	24-4-47	180	22	4,515	4·47	202·02	R. G. Brazier	Glen Iris Golden Oxford (12694)
Tirano Lorna	A.I.S.	47507	20-12 40	26-6-47	210	10·5	5,790	3·41	197·55	J. H. Bensted & Co.	Chittering Prince (3800)
Rutherwood Fairy	Guernsey	11447	28-11-41	7-8-47	273	7·5	3,712	5·06	188·07	Misses E. & I. Rutherford	Rutherwood Sailor (5240)
Mokine Empire's Lily 34th	Jersey	94438	12 12-41	20-8-47	240	6	2,985	6·06	181·17	Davies & Sons	Selsey Hall Boy (15136)
Glanavon Golden Girl 6th	A.I.S.	36555	17-9-41	13-5-47	150	15	4,560	3·96	180·92	D. Bevan & Sons	Newstead Triumph (3420)
Rutherwood Pixie	Guernsey	7826	13 3-38	24-6-47	150	23	3,555	5·07	180·45	Misses E. & I. Rutherford	Rutherwood Rose Chief (4454)
Grassvale Lady Fowler 44th	Jersey	92717	19-8 41	11-5-47	180	11·5	3,705	4·76	176·67	R. G. Brazier	Mornmoot Northwood Beau (17798)
Rutherford Robin's Rosa	Guernsey	9330	30-8-38	26-3-47	273	13·5	3,535	4·98	176·12	Misses E. & I. Rutherford	Denmark Robin Hood (3322)
Valliere Primrose	A.I.S.	....	19-5-40	29-4-47	180	16	4,260	4·03	171·69	W. K. Barnes	Alpha Vale Patrico (3649)
Walgett Handsome Girl 4th	Jersey	59901	5-4-35	3-4-47	150	24·5	3,375	5·02	169·47	C. J. Cunningham	Sabina Vale Betty's Beau (10018)
Clovelly Bobette	Guernsey	10238	12-7 41	11-9-47	90	41	3,810	4·44	169·29	J. Cabassi	Koojan Monogram (4174)
Narrogin Stella	A.I.S.	38676	19-4-40	17-3-47	210	7	4,800	3·46	166·50	Narrogin School of Agriculture	Westby Masterpiece (5403)
Grassvale Lady Fowler 35th	Jersey	92718	1-3-42	11-6-47	120	24	3,075	5·38	165·54	R. G. Brazier	Mornmoot Northwood Beau (17798)
Rosella Girlie	Guernsey	14394	15-2-42	30-8-47	180	7	3,285	4·92	161·70	Darnell Brothers	Muresk Commander (4344)
Carbanup Doris	A.I.S.	35389	3-8-41	2-8-47	90	49·5	4,830	3·17	153·11	D. H. Bell	Glanavon Maestro (4833)
Westby Laurel	A.I.S.	40986	7-2-40	17-5-47	210	8	3,930	3·51	138·18	Narrogin School of Agriculture	Westby Searchlight (3604)
Rosella Queenie	Guernsey	9316	20-9-39	6-7-47	210	6	2,610	5·02	131·07	Darnell Brothers	Muresk Paul (4356)

Congelin Sparkle 4th	Jersey	91297	15-3-41	30-3-47	90	37	3,030	4·11	124·62	D. Bradford	Congelin Washington (18426)
Rutherwood Maid Marion	Guernsey	9328	11-1-39	24 5-47	210	12·5	2,850	4·26	121·47	Misses E. & I. Rutherford	Denmark Robin Hood (3322)
Plenarbor Sapphire	A.I.S.	....	5-3-42	20-5-47	120	16·5	3,135	3·86	121·02	Mrs. V. Alexander	Glanavon Genius (3957)
Melrose Brenda	do.	....	10-7-39	21-11-47	180	3·5	3,435	3·49	120·18	Christian Bros. Farm School	Tipperary Defiance (5329)
Grassvale Northwood Nora ...	Jersey	86646	23-5-41	5-5-47	60	38·5	2,310	5·09	117·78	R. H. Rose & Son	Mornmoot Northwood Beau (17798)
Rosella Duchess 2nd	Guernsey	9310	7-5-39	10-9-47	150	8	2,310	4·84	111·99	Darnell Brothers	Muresk Paul (4356)
Yanget Baron's Grace	A.I.S.	41223	3-9-41	19-2 48	120	29·5	3,105	3·32	103·14	Mrs. V. Alexander	Yanget Baron (6416)
Emerald Vale Countess	do.	....	12-4-39	17-12-47	180	10·5	2,730	3·52	96·18	Christian Bros. Farm School	Glanavon Lancer (4832)
Plenarbor Valli	do.	....	15-2-42	22 4-48	60	35·5	2,205	4·01	88·47	Mrs. V. Alexander	Glanavon Genius (3957)
Yanget Graceful 4th	do.	....	9-10-39	4 5-48	60	33·5	2,010	3·82	76·89	Mrs. V. Alexander	Leylands Defiance (2380)
Travalgan Starbright 14th	Jersey	89349	18-5-41	17-4-47	60	25·5	1,545	4·71	72·84	R. G. Brazier	Glen Iris Golden Oxford (12694)
Plenarbor Sapphire	A.I.S.	....	5-3-42	2-4-48	90	18	1,890	3·66	69·36	Mrs. V. Alexander	Glanavon Genius (3957)
Congelin Iolanthe 10th	Jersey	91295	25-3 41	14-5-47	30	46	1,380	4·63	63·96	D. Bradford	Congelin Washington (18426)
Greenmount Dewdrop 3rd	do.	....	11-8-42	20-3-48	90	9	1,155	5·34	61·77	K. V. Gray	Greenmount Silver Lord (17546)
Claremont Duchess 2nd	A.I.S.	9920	17-10-33	16-4-47	60	35	1,950	2·89	56·40	Narrogin School of Agriculture	Tipperary Virginia's Re-echo (970)
Plenarbor Tulip	do.	29216	4-4-40	20-5-47	60	25·5	1,455	3·63	52·95	Mrs. V. Alexander	Alne Bank Tena's Gift (1766)
Kapara Sparkle 3rd	Jersey	77064	21-7-39	9-5-47	30	28	840	5·61	47·19	D. Bradford	Congelin Mandarin (14542)
Plenarbor Tip Toe	A.I.S.	....	29-5-43	11-6-48	30	29	870	3·62	35·53	Mrs. V. Alexander	Glanavon Genius (3957)
Tirano Daisy	do.	33573	7-5-38	22-2-48	30	26	780	3·56	27·84	M. H. Montgomery	Chittering Prince (3800)
Travalgan Lady Eion 4th	Jersey	74240	28-8-38	4-8-47	60	12	675	3·58	24·18	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Walgett Handsome Girl 16th	do.	84439	29-3-39	21-3-48	30	17	510	4·30	21·93	C. J. Cunningham	Walgett Masterman (15271)

FERTILISERS.

The following fertilisers have been registered at the Department of Agriculture under the Fertiliser Act, 1928, for the year commencing 1st November, 1948 :—

Name of Fertiliser.	Reg. No.	Brand.	By Whom Registered.	Nitrogen (N) as				Phosphoric Acid (P_2O_5) as				Potash (K_2O) as		Cash Price per ton at Works (W) or on Rails Perth (P).
				Nitrate.	Ammonia.	Blood and Bone.	Bone Dust.	Water Sol.	Citrate Sol.	Acid Sol.	Total.	Sulphate.	Muriate.	
A.—MINERAL.														£ s. d.
1. NITROGENOUS.														
(a) Nitrogen as Nitrate.														
Nitrate of Soda	23	C.S.M.L.	Cuming Smith & Mt. Lyell	15.50	....	....	....	....	....	....	....	....	....	18 10 0 (W)
Sodium Nitrate	44	Fauldings	F. H. Faulding & Co., Ltd.	16.00	....	....	....	....	....	....	....	....	....	1 17 4 cwt.
Nitrate of Soda	62	Champion	R. Dundas Smith & Son	16.00	....	....	....	....	....	....	....	....	....	18 10 0 (P)
Nitrate of Soda	84	David Gray's	David Gray & Co. Pty. Ltd.	15·50	....	....	....	....	....	....	....	....	....	11d. per 2 lb. bag
(b) Nitrogen as Ammonia.														
Sulphate of Ammonia	1	I.C.I.A.N.Z.	Cuming Smith & Mt. Lyell		20.50	....	....	....	....	....	....	....	....	18 10 0 (W)
Sulphate of Ammonia	45	Fauldings	F. H. Faulding & Co., Ltd.	....	20.00	....	....	....	....	....	....	....	....	1 12 8 cwt.
Ammonium Nitrate	43	do.	do. do. do.	....	30.00	....	....	....	....	....	....	....	....	6 1 4 cwt.
Sulphate of Ammonia	59	Cresco	Cresco Fertiliser Co.		20.50	....	....	....	....	....	....	....	....	18 10 0 (W)
Sulphate of Ammonia	79	David Gray's	David Gray & Co. Pty. Ltd.	....	21·00	....	....	....	....	....	....	....	....	11d. per 2 lb. bag
Sulphate of Ammonia	89	Tubal	Ralite Products	....	20·50	....	....	..	..	..	....	....	....	
2. PHOSPHATIC.														
(a) Superphosphate.														
Superphosphate 22%	2	Mt. Lyell as ML in diamond	Cuming Smith & Mt. Lyell	....	....	....	....	18.00	2.00	2.00	22.00	....	....	*6 11 0
Do. do.	9	C.S.M.L.	do. do. do.	....	....	....	....	18.00	2.00	2.00	22.00	....	....	*6 11 0
Do. do.	25	Sickle	do. do. do.	....	....	....	....	18.00	2.00	2.00	22.00	....	....	*6 11 0
Do. do.	49	Cresco	Cresco Fertiliser Co.	....	....	....	....	18.00	2.00	2.00	22.00	....	....	*6 11 0
Do. do.	82	David Gray's	David Gray & Co. Pty. Ltd.	....	....	....	....	18·00	2·00	2·00	22·00	....	....	1s. 3½d. per 7 lb. bag
Do. do.	86	Tubal	Ralite Products	....	....	....	....	18·00	2·00	2·00	22·00	....	....	
(b) Superphosphate and Minors.													zinc	
Superphosphate and Zinc	17	C.S.M.L.	Cuming Smith & Mt. Lyell	..	..	..	....	17.00	1.75	1.75	20.50	....	2.50	*7 14 4
Superphosphate and Zinc Sulphate	61	Cresco	Cresco Fertilisers, Ltd.	....	....	....	....	17.00	1.75	1.75	20.50	....	0.80	7 16 4
Superphosphate and Copper No. 1	18	C.S.M.L.	Cuming Smith & Mt. Lyell	....	....	....	....	17.00	1.75	1.75	20.50	copper 1.25	....	*10 8 11
Superphosphate and Copper Ore No. 1	19	do.	do. do. do.	....	....	....	....	15.00	1.50	1.50	18.00	1.60	....	*9 15 11
Superphosphate and Copper Ore No. 2	20	do.	do. do. do.	....	....	....	....	15.00	1.50	1.50	18.00	1.00	....	*8 10 11

Superphosphate and Copper Ore No. 1	31	Sickle ...	do. do. do.	..	...	....	....	15.00	1.50	1.50	18.00	1.60	....	*9 15 11	
Superphosphate and Copper Ore No. 2	32	do.	do. do. do.	..	....	....	....	15.00	1.50	1.50	18.00	1.00	....	*8 10 11	
Superphosphate and Copper Ore No. 3	47	do.	do. do. do.	..	..	....	....	16.00	1.50	1.50	19.00	1.00	....	*8 17 10	
Superphosphate and Copper Ore No. 3	48	C.S.M.L. ...	do. do. do.	..	....	....	....	16.00	1.50	1.50	19.00	1.00	....	*8 17 10	
Superphosphate and Copper Sulphate	50	Cresco	Cresco Fertilisers, Ltd.	....	...	....	....	17.00	1.75	1.75	20.50	1.25	....	*10 8 11	
Superphosphate and Copper Ore No. 1	51	do.	do. do.	..	..	....	....	15.00	1.50	1.50	18.00	1.60	....	*9 15 11	
Superphosphate and Copper Ore No. 2	52	do.	do. do. ...	....	..	....	..	15.00	1.50	1.50	18.00	1.00	manganese	*8 10 11	
Superphosphate and Manganese	21	C.S.M.L. ...	Cuming Smith & Mt. Lyell	..	..	....	....	15.00	1.75	1.75	18.50	....	3.80	*10 16 6	
Superphosphate and Manganese	33	Sickle ...	do. do. do.	..	....	....	....	15.00	1.75	1.75	18.50	..	3.80	*10 16 6	
Superphosphate and Manganese	53	Cresco ..	Cresco Fertilisers, Ltd. .	..	..	....	....	15.00	1.75	1.75	18.50	....	3.80	*10 16 6	
Superphosphate and Copper Ore No. 3	77	do.	do. do. do.	....	....	....	....	16·00	1·50	1·50	19·00	....	Copper 1·00	8 17 10 (W)	
3. POTASSIC.												Potash (K_2O) as			
(a) Potash as Sulphate.												Sulphate	Muriate		
Sulphate of Potash .	8	Mt. Lyell as ML in diamond	Cuming Smith & Mt. Lyell	.		...	.	.	..	.	..	30.00	....	20 0 0 (W)	
Do. do.	22	C.S.M.L. ...	do. do. do.		..	.	.	.	..			30.00	..	20 0 0 (W)	
Do. do.	34	Sickle	do. do. do.		.	.	.	.	..	.	..	30.00	..	20 0 0 (W)	
Do. do.	69	Cresco .	Cresco Fertilisers, Ltd. ..		.	.	.	.	..	..	..	30.00	.	20 0 0 (W)	
Do. do.	76	Chandler	The State (W.A.) Alunite Industry	....	....	....	....	....	....	....	....	30·00	....		
Do. do. . .	81	David Gray's	David Gray & Co. Pty. Ltd.	....	...	....	....	....	....	...	....	30·00	....	11½d. per 2 lb. bag.	
Do. do. ...	88	Tubal	Ralite Products	....	....	....	....	....	....	....	....	30·00	....		
4. NITROGEN AND PHOSPHORIC ACID.															
Potato Manure " C "	5	Mt. Lyell as ML in diamond	Cuming Smith & Mt. Lyell	.	3.50	...	.	14.50	1.50	1.50	17.50	..	.	*9 18 4	
Potato Manure " C "	12	C.S.M.L.	do. do. do.		3.50	...	...	14.50	1.50	1.50	17.50	....	..	*9 18 4	
Potato Manure " C "	28	Sickle ...	do. do. do.	...	3.50	....	...	14.50	1.50	1.50	17.50	.	..	*9 18 4	
Potato Manure " C "	56	Cresco ...	Cresco Fertilisers, Ltd.	.	3.50	..	..	14.50	1.50	1.50	17.50	...	..	*9 18 4	
5. NITROGEN, PHOSPHORIC ACID AND POTASH.															
Potato Manure " A "	3	Mt. Lyell as ML in diamond	Cuming Smith & Mt. Lyell	..	2.50	...	...	12.00	1.25	1.25	14.50	5.00	...	*11 17 2	
Potato Manure " B "	4	do.	do. do. do.		3.50	..	.	11.00	1.25	1.25	13.50	5.00	...	*12 10 5	
Potato Manure " E "	6	do.	do. do. do.		3.50			8.50	1.00	1.00	10.50	8.00	.	*14 1 6	
Potato Manure " A "	10	C.S.M.L.	do. do. do.		2.50	..		12.00	1.25	1.25	14.50	5.00	..	*11 17 2	
Potato Manure " B "	11	C.S.M.L. .	do. do. do.	..	3.50	..	....	11.00	1.25	1.25	13.50	5.00	..	*12 10 5	
Potato Manure " E " ...	13	C.S.M.L. ...	do. do. do.	....	3.50	....	....	8.50	1.00	1.00	10.50	8.00	....	*14 1 6	

FERTILISERS—*continued.*

Name of Fertiliser.	Reg. No.	Brand.	By Whom Registered.	Nitrogen (N) as				Phosphoric Acid (P_2O_5) as				Potash (K_2O) as		Cash Price per ton at Works (W) or on Rails Perth (P).
				Nitrate.	Ammonia.	Blood and Bone.	Bone Dust.	Water Sol.	Citrate Sol.	Acid Sol.	Total.	Sulphate.	Muriate.	
														£ s. d.
Potato Manure "A"	60	Sickle	do. do. do.	....	2.50	....	....	12.00	1.25	1.25	14.50	5.00	....	*11 17 2
Potato Manure "B"	61	do.	do. do. do.	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Potato Manure "E"	63	do.	do. do. do.	....	3.50	....	....	8.50	1.00	1.00	10.50	8.00	....	*14 1 6
Potato Manure "A"	54	Cresco	Cresco Fertilisers, Ltd.	....	2.50	....	....	12.00	1.25	1.25	14.50	5.00	....	*11 17 2
Potato Manure "B"	55	do.	do. do.	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Potato Manure "E"	57	do.	do. do.	....	3.50	....	....	8.50	1.00	1.00	10.50	8.00	....	*14 1 6
Potato Manure "A"	64	Wattle	Wattle Fertiliser Co.	....	2.50	....	....	12.00	1.25	1.25	14.50	5.00	....	*11 17 2
Orchard Manure	7	Mt. Lyell as ML in diamond	Cuming Smith & Mt. Lyell	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Do. do.	14	C.S.M.L.	do. do. do.	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Do. do.	30	Sickle	do. do. do.	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Do. do.	58	Cresco	Cresco Fertilisers, Ltd.	....	3.50	....	....	11.00	1.25	1.25	13.50	5.00	....	*12 10 5
Tomato Manure	15	C.S.M.L.	Cuming Smith & Mt. Lyell	....	3.50	....	....	6.00	0.75	0.75	7.50	12.00	....	*16 3 2
Tobacco Fertiliser	16	do.	do. do. do.	....	3.30	....	....	10.00	1.25	1.25	12.50	5.70	....	*13 0 7
Potato Manure "A"	83	David Gray's	David Gray & Co. Pty. Ltd.	....	2·5	....	....	12·0	1·25	1·25	14·5	5·0	....	7 lb. bags 1s. 8d each.
Potato Manure "A"	87	'Tubal"	Ralite Products	....	2·5	....	....	12·0	1·25	1·25	14·5	5·0	....	
6. MISCELLANEOUS.														
Liquid Fertiliser 10–10–45	36	Nightingale	Wigmores. Ltd.	....	10.00	....	....	10.00	....	....	10.00	5.00	....	15s. per gallon.
Liquid Manure	42	Fauldings	F. H. Faulding & Co.	....	7.50	....	....	5.00	....	....	5.00	3.50	....	
Fertiliser Tablets	66	Summit Growth	L. M. McLeod	....	4.10	....	....	7.00	1.20	0.10	8.30	12.20	....	1s. per box retail.
Plant Food	71	Dawn	Dawn Nurseries	....	5.23	....	....	11.21	1.41	1.46	14.08	....	....	
Lawn Manure	72	do.	do. do.	....	8.54	....	....	9.23	1.36	0.82	11.40	....	....	
Rose Manure	73	do.	do. do.	....	5.90	....	....	10.30	1.52	0.91	12.70	1.64	....	
Bulb and Corm Manure	74	do.	do. do.	....	1.90	....	....	9.20	1.40	0.80	11.40	9.00	....	
Seedling Manure	75	do.	do. do.	....	5.30	....	....	8.75	1.25	1.00	11.00	4.40	....	
Powdered Fertiliser	78	David Gray's	David Gray & Co. Pty. Ltd.	....	5·6	....	....	3·89	....	1·94	5·83	3·2	....	3s. per 7lb. bag
Rose Manure	80	David Gray's	David Gray & Co. Pty. Ltd.	....	5·6	....	....	3·89	....	1·94	5·83	3·2	....	3s. 3d. per 7 lb. bag
Liquid Fertiliser	85	David Gray's	David Gray & Co. Pty. Ltd.	....	9·0	....	....	6·0	....	....	6·0	4·0	....	3s. per 20 oz. bottle
B.—ORGANIC.														
(a) *Blood and Bone.*														
Blood and Bone	24	C.S.M.L.	Cuming Smith & Mt. Lyell	....	....	5.00	....	....	....	12.00	12.00	....	....	11 7 0 (W)
Do.	37	K in diamond A and A Surprise	C. A. Kirkby & Sons	....	....	5.50	....	....	4.00	10.00	14.00	....	....	15 8 6 (P)
Do.	41	Wyndham	Wyndham Meat Works	....	....	6.00	....	....	6.50	9.00	15.50	....	....	14 16 0 (P)
Do	46	Kitchens....	J. Kitchen & Sons	....	....	7.00	....	....	9.00	5.00	14.00	....	....	

Fertiliser "G" (Blood and Bone)	68	Pannifex	Burridge & Warren	....	....	6.25	....	....	7.25	6.25	13.50	....	....	†12 3 0
Blood and Bone	69	Eclipse	The W.A. Meat Export Works	....	....	6.00	....	....	....	....	12.00	....	....	14 0 0 (W)
Do.	70	Robbs	do. do. do.	....	....	5.25	....	....	....	....	14.00	....	....	13 10 0 (W)
Animal Fertiliser	35	Thomas	W. Thomas & Co. (W.A.), Ltd.	....	....	5.00	....	....	3.50	2.00	5.50	....	....	10 18 9 (P)
(b) Bone Dust.														
General Purpose Bone Dust	65	Wattle	Wattle Fertiliser Co.	....	....	....	3.43	....	....	....	20.57	....	....	
(c) Fish Fertilisers.														
Fish Fertiliser	40	Cormo	Nor-West Fertiliser Co.	....	....	5.00	....	....	....	....	8.00	....	...	
(d) Miscellaneous.														
Garden Fertiliser	39	Sprout-Em	Kag Manufacturing Co.	....	....	....	3.75	....	5.00	4.00	9.00	....	....	
C.—MINERAL AND ORGANIC.														
Bone and Superphosphate	63	Wattle	Wattle Fertiliser Co.	....	....	....	1.44	8.75	1.25	10.54	20.54	....	....	11 2 6 (P)
Garden Fertiliser	67	Apex (C & R)	W.A. Produce Co.	....	....	5.00	....	....	....	....	9.00	trace	....	16 10 0 (P)

(W) At Works. (P) Perth. * Cash at Works after deducting Commonwealth Superphosphate Subsidy. † F.O.B. Melbourne.

Notice to Beekeepers

The quarantine service of the Health Department working through its Chief Quarantine Officers (Animals) and Quarantine Officers in each State administers quarantine legislation with respect to bees etc., and this legislation provides that only queen bees and their escorts may be imported from overseas subject to compliance with the following requirements:—

The queen bee and a small escort must be consigned to the Chief Quarantine Officer, Animals, of the State of importation and be accompanied by—

(a) a declaration by the owner stating that they are free from disease and that they are from an apiary that is free from disease and

(b) certification from a Government Veterinary Surgeon or other Officer whose duties relate to Apiculture in the exporting country, certifying that the bees are from a disease free area and that Isle of Wight disease (Acariasis) does not exist in that country or in any apiary within 20 miles of that in which the bees are kept.

Unlike other "animals" listed under the Quarantine Act, bees may be imported by air and in fact this is their usual mode of travel.

On arrival, the cages containing the queens and their escorts are opened one at a time in a glass and gauze cage by a specialist and 15 to 20 of the foreign escorts are selected at random from each cage for dissection and microscopic examination. The queen is examined under a magnifying glass and if she and her escort are found healthy, she is placed in a new cage with a fresh escort and suitable food. The old cage, escort, food, etc., is then burnt and a permit is issued for the release of the queen.

If on the other hand, the bees are found to be diseased they are destroyed by burning together with their cages, food etc.

In 1943, it was found that certain Tasmanian apiaries were infected with *Braula coeca* and for this reason special quarantine conditions were imposed on bee exports from Tasmania to the mainland. These include certification of freedom from disease by a Government Veterinary Surgeon or Apiary Inspector.

The importation of used or second-hand bee hives from overseas is totally prohibited.

These precautions are taken to protect the Australian bee industry against the introduction into this country of *Braula coeca* infestation, Acariasis and Nosema disease which are proclaimed diseases under the Quarantine Act and any other diseases which may endanger the welfare of the Beekeeping Industry.

C.S.I.R. INFORMATION SERVICE.

CHANGE OF ADDRESS.

Readers are advised that the C.S.I.R. Information Service has changed its address and is now located at C.S.I.R. Head Office,

314 ALBERT STREET, EAST MELBOURNE, C.2.

Telephone JA 6611.

ANALYSES OF FEEDING STUFFS.

RESULTS of Analyses of samples of Feeding Stuffs taken under the Feeding Stuffs Act, 1928-1946.

(Published under section 9 of the Act.)

Date Sample taken.	Firm and Brand.	Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chlor.	Phosphoric Acid. P_2O_5.	Lime.	Others.	
		%	%	%	%	%	%	%	%
	David Gray & Co., Pty., Ltd.								
	"Western" Chick Starter—						Ca		
	Registered Analysis	†14.5	†4.0	*4.5	....	2.0	0.5	....	....
2-8-48	Sample Analysis	13.2	2.8	3.9	....	1.36	0.73	....	....
	"Western" Chick Builder—								
	Registered Analysis	†14.0	†4.0	*4.5	....	2·0	0.5	....	....
3-8-48	Sample Analysis	13.2	3.2	3.9	....	1.49	0.60	....	....
	"Western" "A1" Laying Mash								
	Registered Analysis	†14.0	†3.0	*5.0	....	2.0	0.5	....	....
2-8-48	Sample Analysis	15.0	3.1	5.3	....	1.53	0.59	....	....
	"Western" Sweet Dairy Food—								
	Registered Analysis	†12.0	†3.0	*10.0	....	....	0.5	....	....
2-8-48	Sample Analysis	10.1	1.51	4.3	....	....	0.15	....	....
	W. Thomas & Co. (W.A. Ltd.								
	"Thomas" Calf Food—								
	Registered Analysis	†15.5	†2.5	*6.5	3.0	....	15.0	....	....
3-8-48	Sample Analysis	21.7	3.5	6.6	1.08	....	2.53	....	....
	"Thomas" Laying Mash No. 2—								
	Registered Analysis	†11.0	†2.5	*6.5	1.5	....	3.75	....	....
2-8-48	Sample Analysis	12.5	2.9	4.8	1.15	....	1.60	....	....
	Westralian Farmers Co-op Ltd.								
	"Red Comb" Chick Pellets "A"—								....
	Registered Analysis	†15.0	†4.5	*7.0	....	....	0.3	....	
30-7-48	Sample Analysis	15.8	5.1	4.1	....	....	1.05	....	....
	"Red Comb" Chick Pellets "B"—								
	Registered Analysis	†14.0	†4.0	*7.0	0.5	....	0.6	....	....
30-7-48	Sample Analysis	16.2	4.2	3.7	0.64	....	1.10	....	....
	"Red Comb" Growers Pellets								
	Registered Analysis	†13.0	†4.0	*7.0	0.5	....	0.7	....	....
30-7-48	Sample Analysis	13.4	3.9	4.0	0.78	....	1.44	....	....
	"Wesfarmers" Calf Meal—								
	Registered Analysis	†13.0	†3.5	*6.0	less than 1 %	....	0.5	....	....
30-7-48	Sample Analysis	13.3	3.3	3.3	0.86	....	0.82	....	....
	Barrow Linton & Co.								
	"Egglayer" Laying Mash—								
	Registered Analysis	†14.0	†3.5	*4.5	1.0	....	3.0	....	....
5-8-48	Sample Analysis	17.8	5.1	5.7	0.32	....	4.08	....	....
	"Eggoleen"—								
	Registered Analysis	†37.5	*12.0	*1.5	....	....	....	....	....
5-8-48	Sample Analysis	42.2	10.7	1.3	....	....	....	....	....
	"Growell" Growing Mash—								
	Registered Analysis	†14.0	†4.5	*4.5	1.0	....	3.0	....	....
5-8-48	Sample Analysis	18.8	4.8	3.8	0.29	....	5.62	....	....
	"Vitalizer" Chickstarter—								
	Registered Analysis	†15.0	†4.0	*4.5	1.0	....	3.0	....	....
5-8-48	Sample Analysis	20.8	4.7	4.1	0.41	....	4.28	....	....
	David Gray & Co. Pty., Ltd								
	"Western" Calf Food—								
	Registered Analysis	†22.5	†7.0	*5.0	....	2.0	0.5	....	....
4-8-48	Sample Analysis	21.6	8.6	5.0	....	0.97	0.28	....	....
	"Western" Chickbuilder—								
	Registered Analysis	†1 .0	†4.0	*4.5	....	2.0	0.5	....	....
3-8-48	Sample Analysis	13.2	3.2	3.9	....	1.49	0.60	....	....
	"Western" Chickstarter—								
	Registered Analysis	†14.5	†4.0	*4.5	....	2.0	0.5	....	....
2-8-48	Sample Analysis	13.2	2.8	3.9	....	1.36	0.73	....	....
	"Western" Egg Food—								
	Registered Analysis	†30.0	†10.0	*4.0	....	....	0.5	....	....
18-8-48	Sample Analysis	30.4	7.9	4.1	....	....	1.58	....	....
	"Western" Lin Meal—								
	Registered Analysis	†22.5	†7.0	*5.0	....	....	0.5	....	....
18-8-48	Sample Analysis	21.4	5.4	5.0	....	....	0.35	....	....
	"Western" Laying Mash "B"								
	Registered Analysis	†12.5	†3.0	*5.0	....	2.00	0.5	....	....
3-8-48	Sample Analysis	12.8	3.1	3.9	....	0.85	0.08	....	....

*Maximum. †Minimum

ANALYSES OF FEEDING STUFFS—*continued.*

Date Sample taken.	Firm and Brand.	Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chlor.	Phosphoric Acid. P_2O_5.	Lime.	Others.	
		%	%	%	%	%	%	%	%
	David Gray & Co., Pty., Ltd.								
	"Western" A1 Laying Mash—								
	Registered Analysis	†14.0	†3.0	*5.0	....	2.0	0.5	....	....
2-8-48	Sample Analysis	15.0	3.1	5.3	....	1.53	0.59	....	....
	"Western" Sweet Dairy Food—								
	Registered Analysis	†12.0	†3.0	*10.0	....	....	0.5	....	....
2-8-48	Sample Analysis	10.1	1.51	4.3	....	....	0.15	....	....
	W. Thomas & Co. (W.A.), Ltd.								
	"Thomas" Calf Food—								
	Registered Analysis	†15.5	†2.5	*6.5	*3.0	....	*15.0	....	....
3-8-48	Sample Analysis	21.7	3.5	6.6	1.08	....	2.53	....	....
	"Thomas" Chicken Grain—								
	Registered Analysis	†9.0	†1.5	*4.5	....	....	....	....	....
19-8-48	Sample Analysis	8.9	1.4	1.7	....	....	....	....	....
	"Thomas" Egg Protein—								
	Registered Analysis	†42.0	*15.0	*4.5	*8.5	....	15.0	....	....
4-8-48	Sample Analysis	44.6	12.6	0.6	5.26	....	9.57	....	....
	"Thomas" Quicklay —								
	Registered Analysis	†35.0	*12.5	*4.0	*3.0	....	15.0	....	....
18-8-48	Sample Analysis	36.2	11.2	1.4	1.67	....	11.6	....	....
	"Thomas" Laying Mash No.1—								
	Registered Analysis	†14.0	†2.5	*6.0	*1.5	....	*3.75	....	....
4-8-48	Sample Analysis	15.8	4.1	5.1	1.06	....	2.66	....	....
	"Thomas" Sweet Dairy Food—								
	Registered Analysis	†11.5	†1.5	*8.5	*1.75	....	*4.0	....	....
3-8-48	Sample Analysis	13.1	3.1	6.0	2.19	....	1.71	....	....
	"Thomas" Laying Mash No. 2—								
	Registered Analysis	†11.0	†2.5	*6.5	1.5	....	3.75	....	....
2-8-48	Sample Analysis	12.5	2.9	4.8	1.15	....	1.60	....	....
	W.A. Meat Export Works.								
	"W.A.M.E." Bonemeal—								
							CaO		
	Registered Analysis	†18.75	....	....	*0.25	†26.0	†27.0	....	....
23-7-48	Sample Analysis	24.0	....	....	0.15	25.1	33.3	....	....
	"W.A.M.E. Meatmeal—								
	Registered Analysis	†45.0	*13.0	*2.0	....	....	....	....	....
23-7-48	Sample Analysis	44.2	13.7	1.9	....	....	....	....	....
	"W.A.M.E." Bonemeal—								
	Registered Analysis	†18.75	....	....	0.25	†26.0	†27.0	....	....
19-8-48	Sample Analysis	24.3	....	....	0.18	24.9	33.8	....	....
	Westralian Farmers Co-op., Ltd.								
	"Red Comb" Chick Pellets "A"								
	Registered Analysis	†15.0	†4.0	*7.0	....	....	0.3	....	....
30-7-48	Sample Analysis	15.8	5.1	4.1	....	....	1.05	....	....
	"Red Comb" Chick Pellets "B"—								
	Registered Analysis	†14.0	†4.0	*7.0	0.5	....	0.5	....	....
30-7-48	Sample Analysis	16.2	4.2	3.7	0.64	....	1.10	....	....
	"Wesfarmers" Calf Meal—								
					Less than				
	Registered Analysis	†13.0	†3.5	*6.0	1	....	0.5	....	....
30-7-48	Sample Analysis	13.3	3.3	3.3	0.86	....	0.82	....	....
	"Red Comb" Growers Pellets—								
	Registered Analysis	†13.0	†4.0	*7.5	0.5	....	0.7	....	....
30-7-48	Sample Analysis	13.4	3.9	4.0	0.78	....	1.44	....	....
	"Wesfarmers" Laying Mash No. 1—								
	Registered Analysis	†14.0	†4.0	*7.0	0.5	....	1.0	....	....
4-8-48	Sample Analysis	15.5	3.7	3.9	1.06	....	2.42	....	....
	"Red Comb" Laying Pellets No. 1—						$CaCO_3$		
	Registered Analysis	†14.0	†4.0	*7.0	0.5	....	†2.5	....	....
23-7-48	Sample Analysis	13.8	3.8	3.5	0.43	....	2.57	....	....
	"Wesfarmers" Protein Meal "B"—								
	Registered Analysis	†35.0	*10.0	*4.5	....	....	†15.0	....	....
23-7-48	Sample Analysis	34.3	5.9	0.8	....	....	17.89	....	....
	R. B. Young.								
	"Morlay" Chick1Allmash—						Ca		
	Registered Analysis	†12.5	†3.0	*5.5	*1.5	*3.5	†2.0	....	....
20-8-48	Sample Analysis	13.4	2.7	2.5	0.75	2.70	4.03	....	....

* Maximum. † Minimum.

ANALYSES OF FEEDING STUFFS—*continued.*

Date Sample taken.	Firm and Brand.	Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chlor.	Phosphoric Acid. P_2O_5.	Lime.	Others.	
	R. B. Young.	%	%	%	%	%	%	%	%
	" Morlay " Chickstarter—								
	Registered Analysis	†15.0	†3.0	*5.5	*1.5	*3.5	†2.5	....	....
20-8-48	Sample Analysis	15.0	3.2	3.7	1.02	2.45	3.98	....	....
	" Morlay " Fattening Mash " D "								
	Registered Analysis	†10.5	†3.0	*5.0	*1.5	*3.5	†2.0	....	....
20-8-48	Sample Analysis	12.4	3.1	4.1	0.22	2.10	2.39	....	....
	" Morlay " Growing Mash—								
	Registered Analysis	†12.5	†3.0	*5.5	*1.5	*4.0	†2.5	....	....
26-7 48	Sample Analysis	11.5	3.2	3.6	1.02	2.84	4.58	....	....
	" Morlay " Laying Allmash—								
	Registered Analysis	†13.0	†3.0	*6.0	*1.5	*4.0	†2.5	....	....
26-7-48	Sample Analysis	12.8	4.3	3.1	1.29	3.59	3.63	....	....
	" Morlay " Laying Mash—								
	Registered Analysis	†14.0	†3.0	*5.5	*1.5	*3.5	†2.5	....	....
26-7-48	Sample Analysis	13.6	4.2	3.6	0.87	3.54	3.98	....	....

* Maximum. † Minimum.